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A
FLORA
OF THE
MALTESE ISLANDS

BY

S.M. HASLAM, P.D. SELL and P.A. WOLSELEY

WITH CONTRIBUTIONS BY

J. BORG, H. MICALLEF and M. RIX

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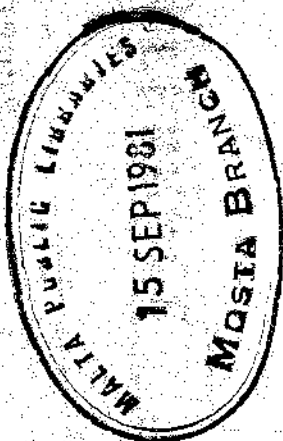


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To
Henry Micallef

under whose auspices this Flora was started
and

to the other Maltese botanists, past and present,
without whose work it could not have been written

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PREFACE

In October 1964 one of us, S.M.H., took up the position of lecturer in Biology in the Royal University of Malta. On returning to England that Christmas she discussed with P.D.S. (who had collected plants in Malta in 1957) the difficulty in taking students into the field without an up-to-date Flora, and the possibility of producing a new one. The last complete Flora of the Islands was by Professor John Borg in 1927. It was scarce, and had one great deficiency for the field botanist, a lack of keys. It was decided that a complete full-scale revision of the Flora was an impossibility, as nobody had the time to carry it out, but that a compilation of what was already known was a possibility, especially if the descriptions being published in *Flora Europaea* could be made a basis for the work.

On her return to Malta, S.M.H. began extracting records from the relevant literature of plants found in the Islands and also descriptions of those species from the parts of *Flora Europaea* already available. In this work, carried out in Malta, she was greatly encouraged by Professor Henry Micallef who was instrumental in obtaining grants from the University to employ help in extracting the records, typing the manuscript and collecting fresh material in the field. This work as far as it was possible had been completed when she left Malta in December 1967. She has returned to Malta on occasions since for further field work.

In the Spring of 1966, P.A.W. became interested in the work and agreed to illustrate the book with one species of each genus, and this task, with a few exceptions, has been carried out. The majority of the plants are drawn from fresh material gathered in Malta, the remainder from a combination of previously published illustrations and herbarium specimens. Other Malta plants are illustrated by Lanfranco (1969) and most of the remainder by Flori and Paoletti (1933). On the completion of her term as lecturer in December 1967 S.M.H. was replaced by P.A.W. who took up the post for two terms. P.A.W. has returned to Malta for substantial periods to illustrate plants and do field work every year since. As more accounts of *Flora Europaea* became available she also took on the work of extracting further descriptions and keys so that during 1971 the account was complete from the ferns to the Dipsacaceae.

As P.D.S. was writing much of the account of *Compositae* for *Flora Europaea* he has dealt with this family for *A Flora of the Maltese Islands* at the same time. He is much indebted to other *Flora Europaea* contributors to this large and difficult family for allowing him to consult their manuscripts, often in a provisional stage, and for advice given *verbatim*.

The Monocotyledons, for which in most cases there was no recent revision on a European scale, posed a considerable problem. Fortunately, Martyn Rix, who was doing research on *Fritillaria* at Cambridge, took on and completed these in 1971 with the exception of the *Cyperaceae* and *Gramineae*. The *Gramineae* have been prepared by P.A.W. under the direction of Dr. A. Melders of the British Museum of Natural History who has also contributed the *Gentianaceae* in the Dicotyledons. P.A.W. has prepared the *Cyperaceae*.

The ecological part of the introduction is original material and has been prepared by S.M.H. and P.A.W. from their fieldwork on the Islands. As fruit trees play such an important part in the landscape of the Islands we are very lucky to be able to include a chapter on their cultivation by Joe Borg who has made the trees of the Islands his particular study. At an early stage Henry Micallef had promised an article on the medicinal plants of Malta, but his untimely death occurred before he had completed it. By the permission of his widow and of the Malta Union of Pharmacists we have however been able to include an extract from an already published paper on the subject.

P.D.S. has throughout acted as general editor so as to obtain as much continuity of style as possible. He has also where necessary made nomenclatural

and taxonomic decisions, some of which (in those groups not yet written for *Flora Europaea*) have had to be made without satisfactory revision.

When it comes to expressing our gratitude for all the help and encouragement we have received during the preparation of the book, it is difficult to know where to begin and where to end.

First and foremost we are grateful to the Editorial Committee of *Flora Europaea* and the Cambridge University Press for permission to reproduce the descriptions of taxa published in that work. Without that permission the project would never have got off the ground.

To the Royal University of Malta we are greatly indebted for bearing the main financial support for the preparation of the manuscript and for publishing the book. In particular we must thank Professor E.J. Borg Constanzi, Vice-Chancellor and Rector Magnificus, who was responsible for granting finance and arrangement of publication, and without whose help the book could not have been completed. In the early days Professor H. Micallef was instrumental in getting the project started, and Mr. John Mangion, Head of Printing in the University Press, has made useful suggestions to P.A.W. concerning the format of the text and illustrations.

We owe a great debt to Dr. Emmanuel Agius, who completed the arrangement for publication after the authors had left Malta. Without his efforts this flora would not now be published.

S.M.H. wishes to thank Miss A. Gatt, who typed all the preliminary manuscript and translated much of the original work in Italian, and Miss V. De Battista who checked references and collected herbarium specimens, while Miss A.V. Camilleri, Miss F. Nicholas, and Mrs. C. Sciberras helped with the collecting and pressing of herbarium specimens, and Dr. P.Y. Royle contributed several unusual specimens.

P.A.W. wishes to thank her parents, Mr. & Mrs. C. H. Newland, for their help and patience during the eight years; Mrs. S. Patterson and Mrs. F. Levson who have provided her with houses during her visits to Malta; Dr. G. Zammit Maempel and Mr. Mario Gauci who spent much available time over Maltese names; Mr. M.A. Delia, former Curator of the Argotti Gardens for access to herbarium material; Mr. J. Sultana for field excursions and hospitality in Gozo. At the British Museum (Natural History) London, P.A.W. would like to thank Dr. M. Melderis and Dr. C. Humpries of the European Herbarium for their help and encouragement, and Dr. W. T. Stearn for valuable help over nomenclature and bibliography; at the Institute of Archeology Professor J. Evans for suggestions on the prehistory sections of the introduction.

Additional grants in connection with the preparation of the final manuscript have been received from the Botanical Research Fund. Permission has kindly been granted by H. Bowen-Jones *et al* for permission to reproduce the map on p. XXII from their book *Malta Background for Development*.

Throughout the project the library and herbarium of the Botany School at the University of Cambridge has been used as a base for checking both references and specimens. During a difficult period financially Professor R.M. Brian, Head of that Department, made available a temporary loan to tide us over. Professor E.J.H. Corner and Dr. S.M. Walters, also of that Department, gave us much help and continual encouragement throughout.

The typing of the final manuscript has been ably carried out by Mrs. A. Hill and Mrs. J.G. Murrell. Mrs. Murrell has also given much other help in putting together the Flora for publication, including the preparation of the index. Mrs. B.S. Croxall has helped with the proof-reading.

To all those mentioned above, and to the many others who have helped in various ways we are greatly indebted.

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England.

April 1974

INTRODUCTION

History of the Study of the Flora

Although the ancient writers Diodorus Siculus, Cicero and Lucretius referred to the cotton cultivation in Malta and Quintinus to the roses, palms, olives, vines, figs and other fruit trees, the first Maltese writer who mentioned the native and cultivated plants of the Islands was Francesco Abela in 1647. In May 1664 the great English botanist John Ray paid a short visit to the Islands. The first list of plants for the Islands, however, was by the Maltese physician Joh. Francesco Bonamico who in 1670 enumerated 243 species, both native and cultivated, a total that was raised to 326 by the Maltese physician and philosopher, Filippo Cavallini, in 1689.

A Sicilian monk, Paolo Boccone, published at Oxford in 1674 some descriptions and illustrations of plants found in Sicily, Malta, France and Italy, and afterwards, under the name of Don Silvio Boccone, published at Venice in 1697 an account of the rare plants of Sicily, Malta, Corsica, Italy, Piedmont and Germany.

The Swedish botanist, Petrus Forskal, in his posthumous *Flora Aegyptiaco-Arabica* in 1775, inserted a short list of Maltese plants including nine cultivated and 78 native species collected for him by the Maltese doctor Giorgio Locano; in 1822, Jules S.C. Dumont D'Urville, a captain of the French navy, mentioned in a publication in the *Mémoires de la Société Linéenne de Paris* 43 native species of Malta.

In 1825 Father Carlo Giacinto of the Discalced Carmelites, Professor of Botany in the Malta University, published in collaboration with Dr. Agostino Naudi and Dr. Stefano Zerafa, a list of 864 species of Phanerogams and Cryptogams, native and cultivated from the Islands of Malta, Gozo and Lampedusa. Delicata (see below) considered 351 Phanerogams and 14 Cryptogams of these to be native of Malta and Gozo.

The first real attempt at a comprehensive Flora of Malta was made by Dr. Stefano Zerafa, Fr. Giacinto's successor in the chair of Botany and Natural History in the Malta University, who in the years 1827 and 1831 published his *Flora Melitensis thesaurus*. He enumerated 644 species of which 9 Cryptogams and 489 Phanerogams were native to the Maltese Islands.

In 1838 P. Brenner, in a chapter on botany in Badger's *Historical Guide to Malta and Gozo*, gave a brief sketch of the Islands' Flora and calculated that about 700 species of Phanerogams were native. A Swede, Carl Frederick Nyman, in a work published at Stockholm in Sweden in 1845, gave under the heading *Om Maltas Växvegetation*, a list of 73 Maltese species collected by him.

In 1849, Dr. G. C. Grech Delicata, who later succeeded Professor Zerafa in the chair of Botany, published in the *Transactions of the Academy of Sciences of Stockholm* a list of 400 species native to the Maltese Islands. His main work, however, was in 1853 when in his *Flora Melitensis* he enumerated 716 species of Phanerogams native to the Islands, 549 Dicotyledons and 167 Monocotyledons.

In 1869, in the *Bulletin de la Société Botanique de France*, Dr. Gavino Gulla, who followed Grech Delicata in the chair of Botany, published a list of Maltese Compositae, followed by a series of papers in the journal *Il Barbi* entitled *Maltese Botany*, dealing with 26 families of Maltese phanerogams. He was engaged on the manuscript of a complete *Analytical Flora of Malta* when he died at the comparatively early age of 54 years.

An Englishman, J.F. Duthie, visited the Islands on two occasions, in 1871-72 and in 1874. An account of the plants he collected was published in the *Journal of Botany (London)*. He also published an alphabetical list of Maltese plants in the

local journal *Il Barth*. Between 30 and 40 of the species he recorded were new to the Islands.

Professor F. Debono, the next occupant of the seat of Botany and Natural History published in *Il Naturalista Maltese* an analytical table of Maltese *Ranunculaceae*.

Count Dr. Alfredo Caruana Gatto contributed several notes on the Islands' Flora. In *Il Naturalista Maltese* in 1890, he published a list of rare species and new varieties of Maltese plants. In the same journal he listed the Maltese *Liliaceae*, besides writing other notes in the *Mediterranean Naturalist* in 1891-93. He reviewed the identifications and writings of his predecessors, who included, in addition to those mentioned previously, Colonel M.J. Godfrey, the Rev. G.M. Godwin, the Rev. George Henslow, the Rev. E. Armitage and Mrs. Grage who had collected in the Islands.

Between 1906 and 1911 Dr. Stefano Sommier published a series of papers on the Maltese Flora, but these were only a prelude to his exhaustive *Flora Melitensis Nova* in collaboration with Dr. A. Caruana Gatto in 1915. Published mainly at the expense of the Italian Government it included 902 species of Phanerogams and 1085 Cryptogams, though many of them have now been reduced to varieties.

Between 1896 and 1920 John Borg published many notes on the plants of the Maltese Islands which culminated in his *Descriptive Flora of the Maltese Islands* in 1927.

The works by Sommier and Caruana Gatto and by John Borg were the last comprehensive Floras of the Islands, and on these our present Flora is based. In 1955 Guido G. Lanfranco published a *Guide to the Flora of Malta* in which were included 300 of the commonest species with small illustrations in black and white. A second edition published in 1969 contained 600 species and illustrations. The work by Bowen-Jones et al. entitled *Malta Background for Development* published by the Department of Geography, University of Durham, England, gives an important account of history and land development in the Islands. During her stay in Malta S.M.I.F. prepared several small booklets on Natural History in the Islands, of which the most important is *Malta's Plant Life* published in 1969.

Topography

The Maltese Islands lie in the central Mediterranean region 58 miles (93 km) due south of Sicily, 220 miles (352 km) due north of Tripoli and about 180 miles (288 km) east of Tunis. The archipelago runs north-west to south-east and is 28 miles (45 km) in length.

Malta, the largest and most southerly island, is 17 miles (27 km) in length and 9 miles (14 km) wide and has an area of 95 square miles. The highest ground in Malta is the stretch of double-tiered sea-cliffs in the south-west, rising to 829 feet (251 metres) above Rdum Dikkiena. The bottom tier of Lower Coralline Limestone rises sheer out of the sea up to 400 feet (120 metres), above which is the yellow Globigerina limestone which forms most of the lower lying areas in Malta. This is overlaid by the Blue Clay and capped by Upper Coralline. From these precipitous cliffs that form the south-west coast the ground falls gradually away to the agricultural and urban areas of the Globigerina basin, surrounding Valletta in the south and ending on the low, rocky and deeply indented coastline on the north-eastern side. The towns of this area include Birkirkara, Hamrun, Pawla, Zejtun, Birzebbuga, Qormi, Zebbug, Siggiewi and Mosta (Fig. 1), and there are many large villages. The north-western part of the island consists mainly of steep, barren hill-ridges of Upper Coralline running approximately north-east and south-west, the most important of which are Marfa Ridge, Mellieha Ridge, Wardija Ridge and the high escarpment extending from Gharghur to Bahrija. In the valleys between the ridges the Upper Coralline is down-thrown to form rich, terraced areas of cultivation where intricate systems of irrigation from wells

and wind-pumps enable the farmers to produce as many as three crops annually. Some of Malta's rare sandy beaches occur on the coastal margin of these down-thrown areas, and the low-lying area at Ghadira has allowed the formation of a sand-dune system and a small salt-marsh.

Gozo to the north is 9 miles (14 km) long, up to 4 miles (6.4 km) wide and has an area of 26 square miles. It is a greener and more agricultural island than Malta, the plateau of Upper Coralline being occupied by the towns and villages of Rabat, Xaghra, Nadur and Zebbug, which are surrounded by the terraced fields of Blue Clay on the slopes. Gozo's coastline on the whole is more precipitous than that of Malta, rising sheer from the sea to 450 feet (135 metres) at Ta' Cenc, where major faults expose the barren Lower Coralline in the surrounding area. The inland valleys tend to be shallow, and agriculture is as in the Globigerina areas of Malta. There are no high ridges.

In both Malta and Gozo the Blue Clay forms a characteristic slope of 15-40° round most of the Upper Coralline formation. The edge of the coralline becomes unstable and large blocks fall into the clay forming the characteristic *rdum* areas (Figs. 15, 16). The highlands in the north-west of Malta, and to a lesser extent in the coastal regions of Gozo are scored by a number of deep, precipitous *wieds* or water courses (Fig. 18), dry except after very heavy rains and mostly overgrown with vegetation.

The island of Comino in the Comino Strait separating the main islands of Malta and Gozo occupies only one square mile. The Coralline limestone rises from the sea to 247 feet (75 metres) on the south-west side, from where it slopes towards the Gozo channel. It is an exposed and barren island where fresh water is scarce. There has been little cultivation, except around St. Mary's Bay, though the island was fortified during the Knights' occupation, and an isolation hospital was later built there. There are now two hotels on the island, but only a handful of local residents. Several rocky islets occur in the Maltese Archipelago, the most important being Cominotto adjacent to Comino, and Filfla, three miles south-west of Malta, which is used for military target practice.

A submarine ridge, averaging 50 fathoms in depth, extends southwards from the Ragusa peninsula of Sicily towards the islands, and it continues on as a broader and deeper shelf to the African coasts of Tunisia and Tripolitania. This submarine ridge, which separates the Mediterranean into two main hydrographic basins, represents a sunken land bridge which connected Africa and Europe during parts of the Pleistocene and later Tertiary.

	C ₁₄ chronology BC	Traditional dates BC
	Trump 1966	pre 1960
Tarxien Cemetery	2000-1450	1450-1350
Tarxien	2400-2000	1650-1450
Ggantija	2850-2400	1800-1650
Mgarr	2900-2850	
Zebbug	3200-2900	Culture sequence
Red Skorba	3400-3200	changed
Grey Skorba	3600-3400	
Ghar Dalam	3800-3600	2300-2100

Sequence of occupation by prehistoric people with suggested C₁₄ dates.

The retreat of the ice after the last glaciation caused the level of the Mediterranean Sea to rise and isolate Malta from N. Africa and Sicily. There is no evidence for Paleolithic Man in Malta, although there are bone deposits rich in

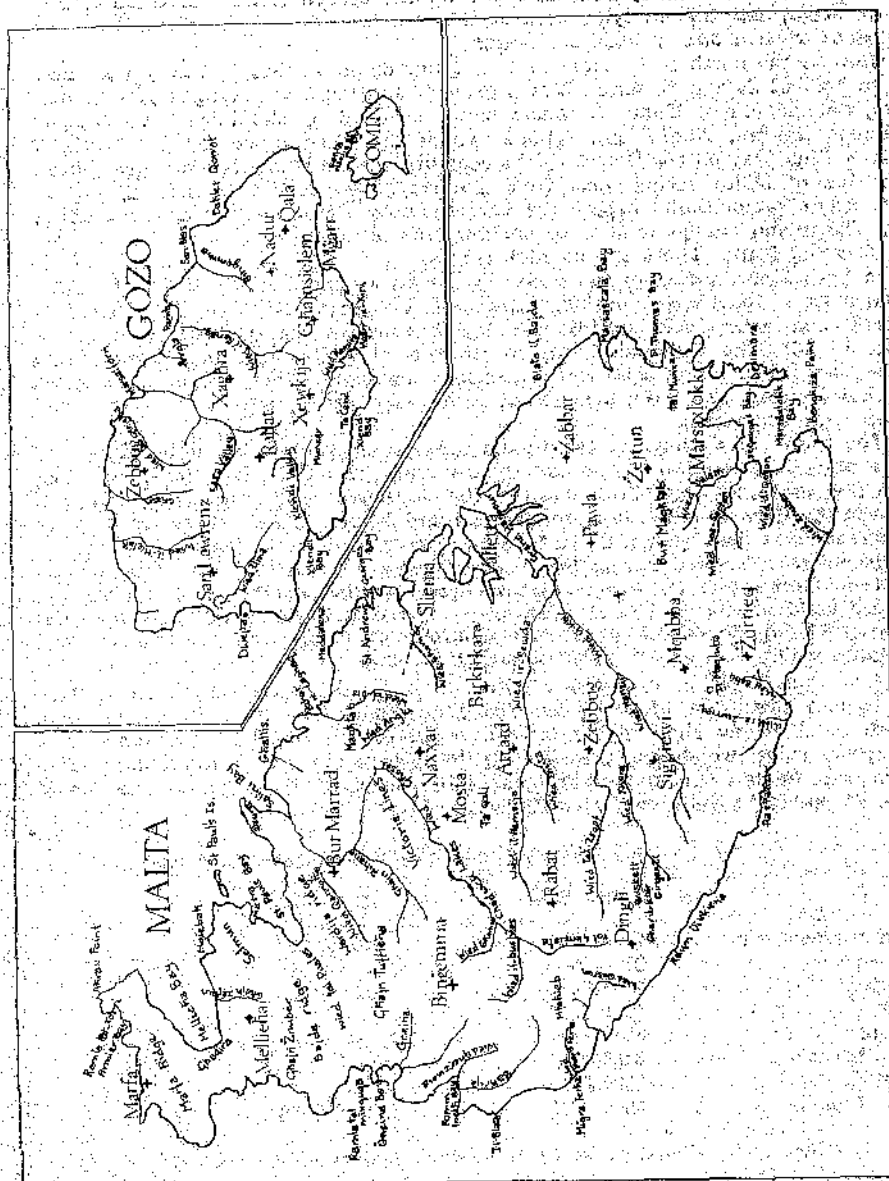


Fig. 1 Settlements and sites referred to in the text.

animal species as at Ghar Dalam. The first settlers must have arrived by sea c. 4000 B.C. (+ 150 years) (C14 dating, Trump (1966). Dendrochronological evidence has recently shown that C14 dating is inaccurate, owing to variations in the amount of C14 present during prehistoric times. At present there is no reliable scale to calculate this inaccuracy, but the arrival of these settlers may be as early as 5000 B.C. (Renfrew 1972). Animal and plant remains around their settlements show that these people were already farmers.

There is a cultural break between these people and the 'temple-builders' who arrived c. 3200 B.C. and occupied Malta for the next 1400 years. The temples were built of stone and skilfully semi-domed. The size and number of these temples indicates a substantial population on the Islands, but there was no evidence for domestic sites until Trump's careful excavation of Skorba (Trump, 1966). Here he demonstrated continuous occupation from the earliest Ghar Dalam phase to the Mgarr phase (p. xi). The remains were adjacent to the temple at Skorba, but it is possible that elsewhere subsequent occupation destroyed or overlaid early settlements. The uniqueness of the buildings and culture of these people suggest a high level of organisation.

The Bronze Age people who arrived c. 2000 B.C. have left both domestic and fortified remains as at Bahrija and Borg in-Nadur. At Tarxien they reused temple material from the earlier period. During this period there is evidence for contact with parts of the Mediterranean.

The Phoenicians arrived in Malta sometime during the ninth century B.C. For sea-faring nations Malta provides excellent harbours and holds a strategic position in the Mediterranean. What little evidence there is at present shows that the Phoenicians settled on the islands in at least four centres (vide Ptolemy): Melite (Rabat and Mdina), Chersonesus (?Valletta), Hera (Marsaxlokk), and Heracles (location unknown, vide Mosehat, 1968). Rock-cut tombs are found in numbers at Mtarfa, Bingemma, near Rabat, Ghajn Qajet and elsewhere. The second Punic Wars brought control of the Islands to the Romans in 218 B.C., but their occupation apparently left little cultural effect. Inscriptions from this period show that the language was still Punic. The Islands adopted Christianity after St. Paul was shipwrecked there in A.D. 60.

The periods after the Saracens invaded in 870 A.D. are badly chronicled. The Norman kingdom of Sicily took over in 1090, followed by several other European powers. There are few signs of settlements on the Islands and the inhabitants were left unprotected from the frequent pirate raids until the knights of St. John arrived in 1530. Even today the Maltese farmer often lives in the villages and walks to his fields each day.

The arrival of the knights heralded a period of great architectural activity. First of all they had to fortify the Islands against the Turks, who had expelled them from Rhodes in 1522. Also, to live on this apparently barren rocky island in the manner to which they were accustomed they had to build auberges and churches. These buildings and fortifications remain a feature of the Islands today. Their sources of income were derived from lands in Europe. The French revolution deprived them of these resources and they capitulated to Napoleon in 1798. The Maltese joined forces with the British to overcome Napoleon's garrison, and thereafter remained in the British Empire until their independence in 1964.

Despite such a history of alien rule the Maltese language still contains a strong Semitic element.

The population of the Maltese Islands in 1970 was 325,000, an average of 2,666 head of population per square mile. This is the second densest population in the world, ranking next after Hong Kong.

Fig. 2. Average Meteorological Data

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Rainfall (mm.)	91	54	42	22	12	2	0.5	7	31	103	68	78
Maximum temperature (°C)	14.5	13	16	18.5	22	27	29	30	27.5	24	20	16.5
Minimum temperature (°C)	10	10	10.5	12.5	15.5	19	22	23.5	21	18	15	12.5
Sunshine (hours)	5.4	6.4	7.4	8.7	9.9	11.6	12.4	11.5	9.4	7.4	8.1	5.2

Fig. 3. Monthly meteorological data for the years 1954-58

(from Bowen Jones et al. (1961))

	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
Rainfall (mm.)												
1954-5	7	47	112	79	60	89	76	79	1	-	1	41
1955-6	99	72	35	42	99	97	59	-	1	-	-	-
1956-7	38	79	30	163	96	6	11	10	16	2	-	-
1957-8	44	149	159	150	57	57	37	10	12	1	-	-
Rain days (numbers)												
1954-5	4	7	18	12	15	4	14	10	2	-	1	3
1955-6	11	15	12	8	13	17	10	-	3	-	-	-
1956-7	4	9	15	19	19	4	5	5	6	2	-	-
1957-8	5	11	18	13	14	9	10	6	3	1	-	-
Mean maximum temperatures (°C)												
1954-5	29	22	19	16.5	16.5	17.5	17	17	23	26.5	29.5	29.5
1955-6	26.5	23	20	18	16	13	15	18.5	22	25	29.5	30
1956-7	28	23	19.5	15.5	14.5	17	16	18	22	26.5	28.5	30
1957-8	27	24	20	16	14.5	15.5	16	18	23	25	28	31
Mean minimum temperatures (°C)												
1954-5	22	17	14.5	12.5	13	12.5	12	13	17	20.5	23	23
1955-6	21	18	15	11	12	10.5	10.5	13	15.5	19.5	22.5	23.5
1956-7	22.5	18	15	11	12	11.5	11.5	13.5	15.5	20	22	23.5
1957-8	21.5	19.5	15.5	11.5	10.5	10.5	11	12.5	16.5	19.5	21.5	24

Fig. 4. Relative Humidity for the years 1960-1963.

(hours GMT)	1963				1962				1961				1960			
	03	09	15	21	03	09	15	21	03	09	15	21	03	09	15	21
Jan.	81	72	67	79	81	78	73	83	79	73	70	79	84	68	67	81
Feb.	83	67	64	78	83	80	73	86	80	67	63	78	85	69	66	83
March	83	66	65	83	80	64	66	81	86	64	63	84	80	72	68	79
April	90	66	67	86	84	55	54	75	83	57	53	78	81	58	53	74
May	86	62	55	80	77	52	48	69	80	51	49	71	84	59	57	77
June	84	64	57	81	76	48	48	68	84	62	59	79	83	58	51	75
July	79	57	56	84	73	53	48	76	78	61	57	76	84	61	57	75
Aug.	83	65	66	79	80	55	56	75	86	59	56	75	81	67	65	79
Sept.	82	70	68	81	81	67	66	79	78	60	60	76	80	68	67	79
Oct.	81	71	68	81	70	66	63	77	81	60	67	80	77	70	69	75
Nov.	84	81	83	88	80	69	70	75	80	71	70	77				
Dec.																

Climate

The Maltese Islands have a Mediterranean climate, with hot dry summers and cool wet winters. Average data are shown in Fig. 2, and the seasonal pattern in Fig. 3.

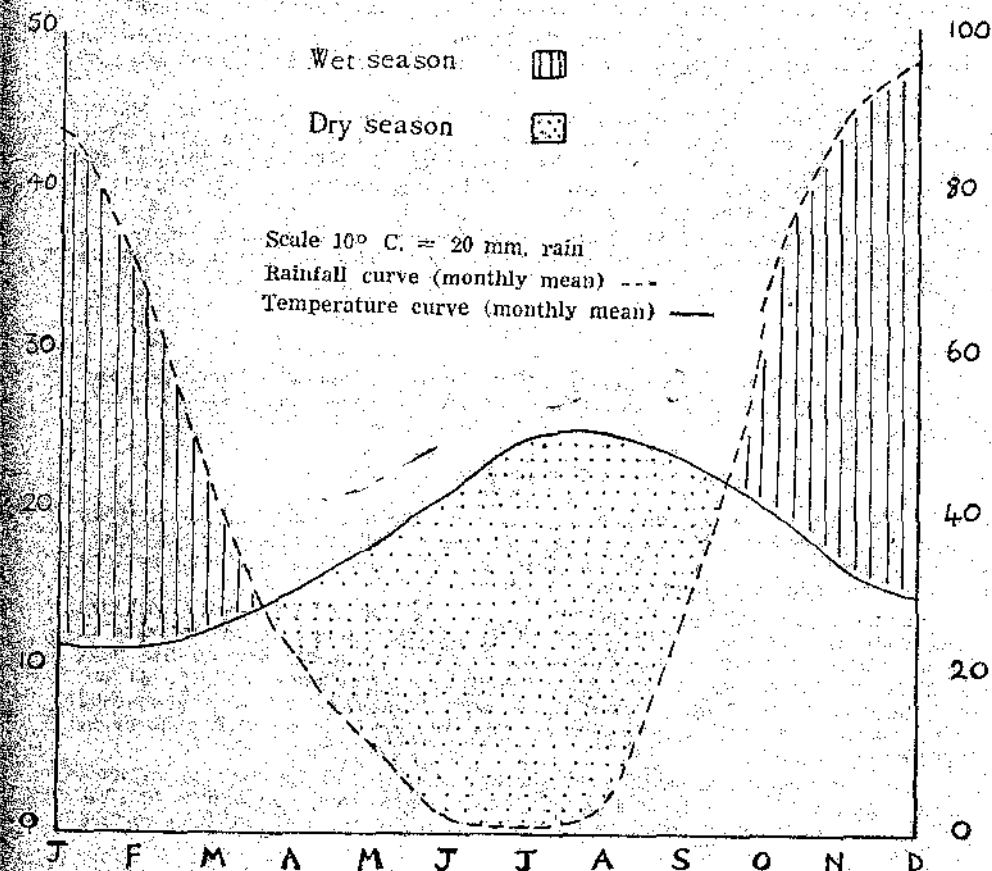


Fig. 5. Climate-diagram of Rainfall and Temperature.

Rainfall

Rainfall is usually negligible between May and August (and, in some years, September), and as the temperature averages 26.5°C between June and September, the summer is unfavourable for plant growth.

In autumn rain typically falls in heavy but short storms, October being the month with the highest average fall. In winter and spring it is usually less heavy, March mostly being the last month with sufficient rain for a good growth of vegetation in shallow soils.

The annual rainfall averages about 500 mm., but is very variable. In 4% of years it is below 50% of the average, in 5% of years it is over 150% of it, and in only 86% of years is it within 25% of the average. There is also variation in monthly rainfall from one year to another (Fig. 3). The average November rain fall for two consecutive ten year periods was 8 and 115 mm. This liability to drought and seasonal variation can seriously disturb agricultural production.

Rainfall is often variable within the Islands. A striking example occurred in October 1965, when 275 mm. of water fell in a heavy storm in Floriana and less than 40 mm. in Rabat.

While the monthly rainfall usually decreases between October and March, the number of days on which rain falls each month remains more stable. The amount of rain falling per day is highest in autumn. In 1965, five of the six days with over 25 mm. rain were in October and early November, and one was in February. This distribution is typical.

Hail is precipitated during some storms. About twice each winter there is a shower of soft white hailstones which resemble snow and sometimes remain on the ground for a few hours.

Dew

Dew is often heavy, particularly between April and September, when the rainfall is slight. Dew can also be heavy in other dry periods e.g. November, February and March.

Temperature

In striking contrast to the rainfall, the temperature is remarkably stable from year to year (Fig. 3). Hence the very marked annual differences in vegetation are due more to variations in rainfall than to those in temperature. The difference between day and night temperatures is slight.

January, February and March are, on average, the coldest months with dry temperatures averaging hardly above 15°C and night ones, hardly above 10°C. Light frosts occur. Grass minimum temperatures were below 0°C on five days in 1965, and three days in 1966, the lowest temperatures being -2°C in 1965 and -5°C in 1966. These 'frosts' usually last a very short time, and have no marked effect on the vegetation. Cat-ice (not recorded in 1964-7) is reported to form on puddles occasionally.

July and August are normally the hottest months, and the maxima, in some years, reach 43°C. Grass level and soil surface temperatures go higher. In 1966, not a hot summer, grass level temperatures were up to 40°C, and soil surface ones frequently above 40°C.

Sunshine

The Maltese Islands have a sunny climate. In mid-summer, sunshine hours average about 12 per day, day length being around 14 hours. Even in mid-winter the average sunshine is over 5 hours, the amount of cloud being low. Even in the exceptionally wet winter of 1965, winter sunshine averaged 5.5 hours per day, and up to mid-April there were only 14 days with not more than one hour of sunshine.

Humidity

Relative humidity is high, usually 65-80%, with little seasonal variation, and rarely falling below 40% (fig (b)). This is higher than that in coastal regions of neighbouring Mediterranean countries.

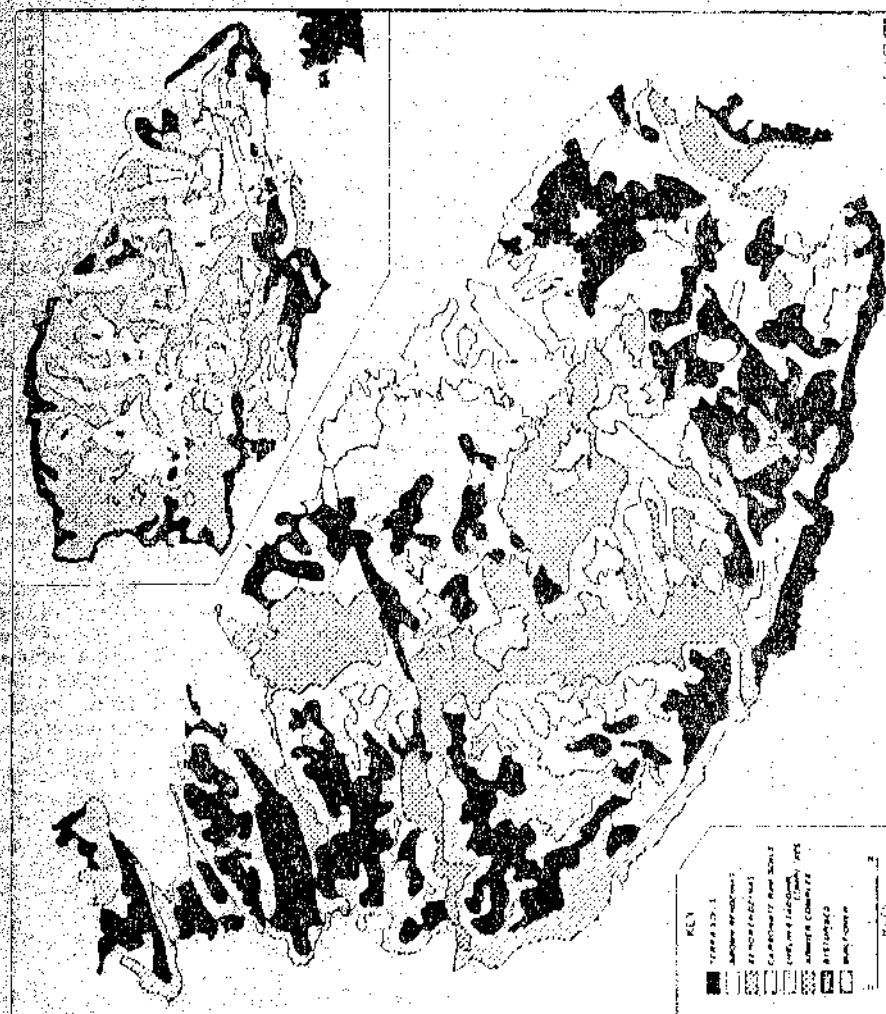


Fig. 6. Soils of Malta and Gozo.

Wind

The Maltese climate is very windy. Only 10% of days are calm, with summer and autumn being less windy than spring and winter (the maximum number of calm days are in August, with 14%, and the minimum number in April, with 7%). The cool north-westerly Majjistral blows, on average, on 29% of days in the year, the dry north-easterly Grigal on 15%, and the hot humid Xlokk (Sirocco) on 13%. The northerly Tramuntana brings the coldest weather, and the southerly Nofsinhar the hottest.

Fig. 7. Average data of Chemical Analyses of Surface Soils.

(Modified from Bowen-Jones et al. (1960).)

Soil type	Organic matter %	pH	Available phosphates	% of total bases		Total exchangeable bases m.eq./100g
				calcium	magnesium potassium	
1) Carbonate raw soils						
a) sand to sandy loam	1.4	8.3	-	91	6.5	24
b) clay loam and light clay	1.6	8.5	18	85	11.3	36
c) heavy clay	1.4	8.7	22	65	24	24
2) Xerorendzinas						
a) sandy loam to clay	1.9	8.5	30	85	10.5	22
b) silt loam, loam, clay loam	3.0	8.4	81	83	10.1	32
3) Terra soils						
a) Clay, loam and clay	4.5	8.1	30	85	9.4	43

Soils

Maltese soils are highly calcareous (with pH normally over 8.0), all being derived from calcareous rock. There are three main types (Fig. 6).

The carbonate raw soils are of relatively recent origin. Their organic content is very low, usually 1 - 1.5%, and consists of raw humus and undecomposed plant remains. The surface layer is usually brownish. The calcium carbonate content (mainly in calcite grains) is 80-90% in soils derived from soft limestone, and 50-60% in those from the Blue Clay. Carbonate raw soils are found on Blue Clay, Globigerina limestone and Upper Coralline limestone scarps mainly in the south-west of Malta and centre of Gozo (Fig. 6). Apart from the sandier soils, these areas usually have little or no terracing, large fields and low walls. The steeper clay slopes, however, have little soil, frequent gullying, and are unworked.

Xerorendzina soils are rather more mature, with less unweathered rock waste and slightly more humus. The organic content is usually 2-3%, but may be up to 6% in uncultivated soils. The surface layer is usually pale brown. The calcium carbonate content is 55-80%, which is less than that of carbonate raw soils derived from limestone. Xerorendzinas are common in central Malta, and central and west Gozo. The land is usually strongly terraced.

The terra (terra fusca, terra rossa and intermediates) soils are the oldest, and were formed under a different, and probably wetter climate than that of the present time. They are relic soils of ancient origin that have changed little in recent times.

The organic matter content is comparatively high, about 4.5% (lower in cultivated, higher in uncultivated soils). Because of the downward movement (leaching) of calcium carbonate under the influence of rain in the past, its content now is only 2-15%. The soils are usually reddish. They occur mainly on the karstlands of the Upper and Lower Coralline limestones, mostly in the north, south and south-east of Malta, and near the coasts of Gozo.

Soils which are too disturbed and altered to fall into these categories occur locally throughout the Islands, on any rock type.

It should be noted that the tradition that much of the soil of the Maltese Islands was transported from Sicily and Italy is not supported by the evidence.

The soil depth usually has more effect on the vegetation than the soil type. Depth in a warm climate has a controlling effect on moisture. Soil depth varies from pockets a few centimetres thick and bare rock in the karstlands, to areas over half a metre deep in the flat alluvial valleys. In spring it is noticeable that the vegetation of the shallow soils dries and dies before that of deeper soils alongside. Roots of some herbs as well as of trees can grow deep into cracks in the rock below, thereby reaching a less ephemeral supply of water.

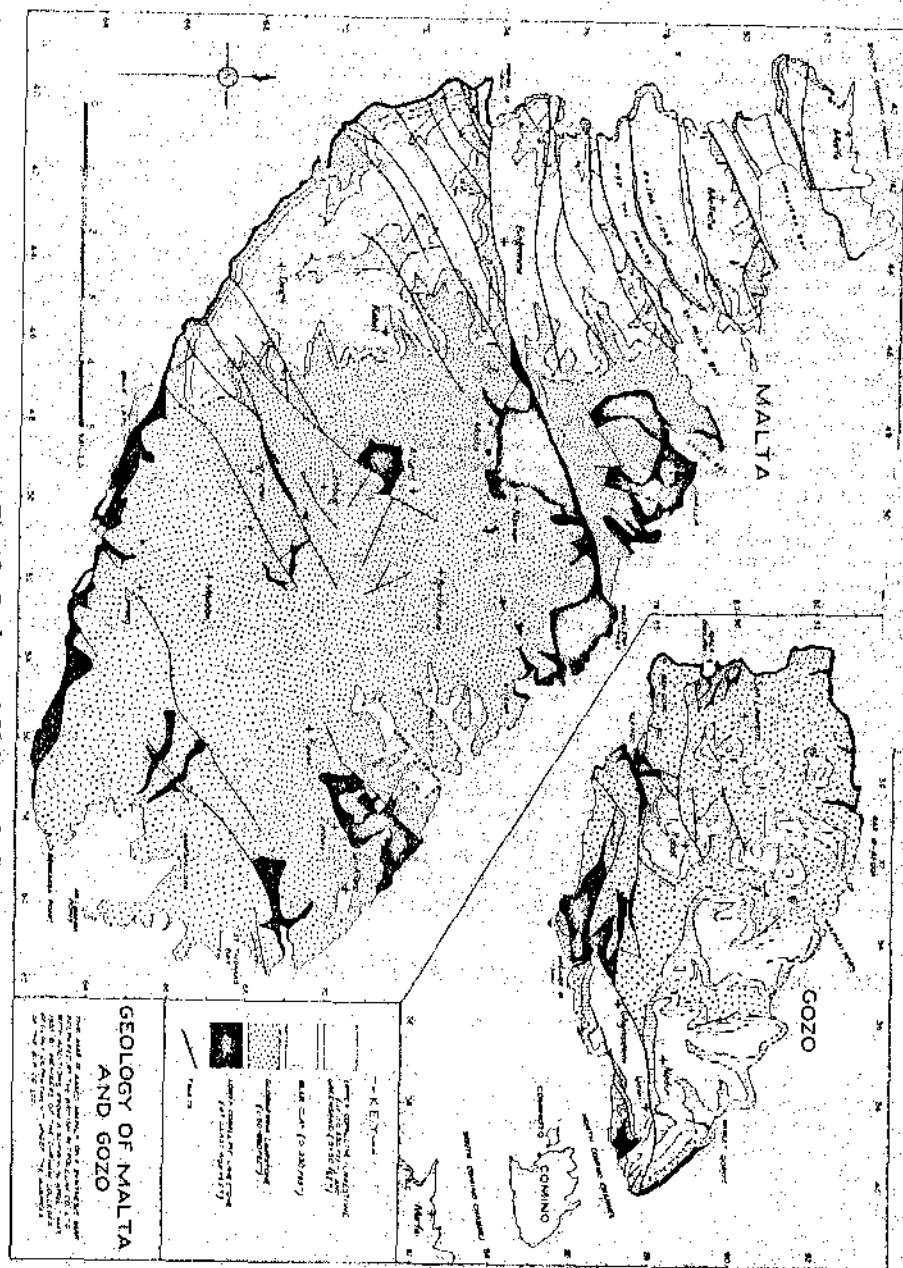
Geological and Ecological areas and their types of vegetation

Geological background to the plant communities

The distribution of plant communities in the Maltese Islands is closely related to the geology and topography of the country. Those features that affect the plant communities are described below. A full geological description is available elsewhere (Hyde 1955).

The geological structure of the Maltese Islands is markedly uniform, consisting of Tertiary calcareous sedimentary rocks, clays and marls (Fig. 8), differing mainly in their appearance and consistency. The Upper and Lower Coralline Limestones are both hard, often densely crystalline rocks, forming the two tiers of vertical cliffs on the south-west coast of Malta. The Lower Coralline, the oldest rock in the Maltese Islands, is exposed at sea level on the south-west

Fig. 8. Geology of Malta and Gozo.



coasts of Malta and Gozo, forming cliffs that rise vertically out of the sea for up to 450 ft. Inland the Lower Coralline is exposed as an inlier in some places where it either forms barren stretches of rocky ground as at Naxxar and Għallis or steep-sided valleys as at Wied Inċita, Wied Has-Saptan and Wied il-Għasel. These are not differentiated from the valleys found on the Upper Coralline. The soft yellow Globigerina limestone lies above the Lower Coralline. Readily eroded it forms the plains and rounded contours of the southern half of Malta and the northern half of Gozo. It also forms most of the 65 miles (104 km) of sloping rocky shore in Malta. This fine-grained, even-textured rock has been quarried and used as a building stone since prehistoric times. The scattered quarries are frequently abandoned and used as fields. Only the coastal areas support a native community of plants. The inland areas are usually intensively agricultural or urban except for a few watercourses which are left more or less undisturbed (Fig. 20).

The Blue Clay forms a characteristic unstable creeping slope of 15-40° below the Upper Coralline plateaus in Malta and Gozo. The physical characteristics of the clay create an unstable junction between these two formations, causing the scarp edge to crumble on to the clay slopes, known as *rdum* areas. This junction is also the spring line for the upper water table. The slopes below are usually terraced and furrowed despite the intractability of the clay which is unstable in the wet season and drought-cracked in summer.

At the base of the Upper Coralline cliffs there is frequently a layer of coarse orange-brown greensand. Its plant community does not appear to differ from that of the coralline cliffs above.

The Upper Coralline plateaus rise to 829 ft. (251 m.) at the Dingli cliffs. Occupying most of the northern half of Malta, they are mostly exposed arid areas (*Anghri*). The rock is frequently jointed with a rough stony surface and underground caverns so that the plateaus resemble the karst areas of Eastern Europe. Wherever there are coralline rocks, on the coast or inland there are steep-sided water-worn valleys (*Widien* — singular *Wied*).

Geological features distinguishing the islands.

Malta: The geological formations cut the Island into two topographical areas, the Globigerina plains and sloping rocky coasts of the southern half, and the hills, valleys and cliffs of coralline and Blue Clay in the north western half of the Island. The most southerly point of the Upper Coralline plateau is at *Gebel Ciantar*. To the north of this, the plateau is intersected by a series of parallel faults running east-north-east across the Island producing an area of ridges and valleys. The most striking of these runs along the Victoria Lines, the downthrow north ranging between 300 and 600 ft. along its length. At the eastern end the Lower Coralline is exposed forming the barren slopes and cliffs from Naxxar to St. Andrews. Towards the west the ridge rises to 750 ft. at Nadur tower. To the north the land drops steeply to about 275 ft. (84 m.) in the Bingemma valley followed by the remaining series of ridges of Wardija, Bajda, Mellieħa and Marfa; the valleys being Pwales, Mżieb, and Ghadira. These valleys are down-thrown rift valleys of Upper Coralline. They are fertile areas and intensively cultivated as at Pwales. At their coastal edges, there are the remains of sandy bays, and at Ghadira the remnants of a sand dune system on the low-lying isthmus. Both are rare features of the Maltese Islands.

Gozo: Gozo is composed of the same geological formations as Malta, but there are several features which give the Island a distinctive appearance. The apparent hilliness is due to the isolation of the areas of Upper Coralline plateau capping the Blue Clay slopes as at Xagħra, Nadur, Zebbuġ, Victoria, Għarb, and many other smaller isolated hill tops about 500 ft (150 m.) high. These also support the urban

areas of the island. They are surrounded by extensive terraced clay slopes giving the island a green agricultural appearance in winter and spring. The Globigerina is exposed at the north-west end of Gozo and in the lower valleys of the south-east. These, as in Malta, are highly agricultural with a small area of native plant communities surrounding the winter watercourses. The Lower Coralline is rarely exposed on the land surface except at Ta' Cenċ, where it is faulted and exposed as a barren plateau with cliffs rising vertically from the sea to 475 ft. (150 m.). Two steep-sided valleys follow the fault lines inland at Mgarr ix-Xini and Xlendi. The Lower Coralline is exposed to a lesser extent at Dwejra forming the cliffs around the inland sea, and below Qala where it borders the north Comino channel.

Comino is a barren area of Upper Coralline limestone with little remaining agriculture except in the Sta. Marija valley. On the eastern side the cliffs rise up to 247 ft. (75 m.) and to the west of this the land slopes away to the sea.

Selmunett lies about 100 metres off the north-east coast of Malta and is composed of the Upper Coralline Limestone faulted off from the mainland to the west.

Filfla lies on the south-west coast of Malta off the Dingli cliffs. This upper Coralline cliff island has a plateau of 2 acres with an rdum area below which makes access difficult (Filfla (1970)).

Ecological areas

The Maltese Islands have a total area of 122½ square miles (318 square km.) and there is only one point on Malta, the largest island, that is as much as 4 miles (6.5 km.) from the coast. According to weather conditions salt spray may be blown on to any vegetation on the island. Thus all species occurring on the islands must be more or less salt-tolerant. The coastal species, however, receive regular inundation of salt water or spray during the winter and spring months. There is little tidal variation in the islands so that the zone of regular inundation is comparatively narrow.

The coastline is 181 (288 km.) miles long and distributed as shown in Fig. 9.

	Malta	Gozo	Other islands
Land surface			
in square miles	95	26	1½
in square km.	238	68	4
Sea coast			
in miles	144	28	9
in km.	230	45	14
Coralline cliffs	24%	57%	-
Sloping rocky shore	66%	27%	-
Soil or clay slope	9%	16%	-
Sandy bay and saltmarsh	1%	0.5%	-

expressed as % of total sea shore

Fig. 9. Proportional distribution of coastal rocks and deposits.

In the Maltese coastline the greater proportion of sloping rocky shore is accompanied by a greater number of bays and inlets as in the Valletta area. In shallow bays there is also the possibility of accumulation of deposits — either water-borne (saltmarsh) or wind blown (sand dune).

Although the clay areas and soil covered slopes are included in one category in Fig. 9, physically and ecologically they are distinct. The clay slope is essentially lacking in humus and unstable; whereas the abandoned fields or areas of coastal soil as at Delimara are relatively stable and humus-rich. This allows the development of shrubby species which are conspicuously absent from the coastal clay slopes.

The sloping rocky shore is a much disturbed area in Malta of high amenity value. It is an unstable habitat with occasional pockets of soil on the rough rocky surface which are likely to be removed by winter storms, so that the area close to the water best favours annual plants. Perennial and shrubby species that withstand salt spray occur inland of this area. In contrast, the cliffs of Malta's coasts are undisturbed by Man. They have few places where soil can collect and no horizontal zonation, so that perennial, often shrubby species are more frequent.

The species occurring on the coasts of the Maltese Islands are distributed as follows:—

Sloping rocky shores	5% of total flora
Coralline cliffs	1.8% of total flora
Clay or soil slopes	1.7% of total flora
Sandy bays	3.6% of total flora
Salt marshes	1.7% of total flora
In sea water	0.3% of total flora

Total 14%

Where a species is found in two or more categories it is included in each.

The greatest number of species is found in the sandy bay and saltmarsh areas. Although these areas are infrequent, the conditions occurring are relatively stable or regularly unstable (e.g. wind-blown sands), allowing the development of a more complex plant community. Until recently these were undisturbed areas and the distribution diagram includes many species not recorded in this century as well as some that are now extremely rare.

Inland, the ecological areas remain associated with the geological structure and topographical features as shown in Fig. 8. The Upper Coralline plateaus usually occupy the higher parts of the islands. Exposed to the full force of the winds and arid for 6 months of the year, they have largely remained agriculturally undisturbed or abandoned except as grazing land for goats. Where these are water-worn valleys (whether towards the coast as at Wied Babu or inland as along the Mellieħa ridge) they are steep-sided with running water in the bottom for seven months of the year. The steep sides are as arid as the plateau, but protected from the wind, and probably more important, from the goats, they support more shrubby species.

The edges of the Upper Coralline plateaus are unstable vertical scarps (Figs. 10, 15) on the Blue Clay slopes below. These edges are 92 miles (145 km.) long in Malta and 38 miles (60 km.) long in Gozo. The narrow zone along the scarp edges varies in degree of exposure but the spring line ensures that there is luxuriant vegetation, especially of scramblers and climbers. These ecological

divisions contains 43% of the species of the Flora, and the bulk of the native Flora.

The distribution of species in the inland areas of the Maltese Islands is as follows:—

Coralline plateau and slope	21.4%
Valley and scarp edge	21.6%
Arable land	24%
Waste land	16%
Introductions	4%
	87%

40% of the Flora consists of species found in arable and waste places. These coincide with the agricultural and urban areas. More species are continually introduced with new systems of agriculture as in glasshouses.

Maritime Communities

Maritime communities are those containing species confined to coastal regions regularly receiving salt spray, irrespective of the presence or absence of inland species. They may grade into inland communities, or there may be a sharp boundary to agricultural or built-up land.

Maritime species must tolerate or prefer the presence of salt, either just from spray, or also from salt accumulated in the soil. Perennials occur in habitats which are tolerable for land plants throughout the year. Annuals, in contrast, can grow in those places temporarily tolerable, e.g. in rocky shores close to the sea which receive storm floods in winter.

The main season of flowering of Maltese plants is March-May (Haslam 1969). However, the maritime species mainly flower from June to October (Fig. 13). This is also the period least liable to storms.

Mediterranean tides are slight, only about 15 cm. daily, and greater variations in sea level are caused by wind and the consequent currents.

Rocky shores

Most of the coast of the Maltese Islands is exposed and rocky, and varies from gentle slopes to tall cliffs. In Malta, the north and east coasts (apart from the bastions of the Grand Harbour area) are mainly gentle slopes, and most of the cliffs are on the south-west and west sides.

Sloping shores

The most common coastal habitat is a gentle slope of bare rock with a few pockets of soil (Fig. 11). Plants colonise where they can anchor, in soil pockets and cracks in the rock. Soil cover and depth, exposure to wind and storm, and human interference all vary considerably. While plants are sparse throughout, their frequency naturally varies with these factors.

Widespread and characteristic species include:—

(perennials)	<i>Crithmum maritimum</i> (with little soil)
	<i>Inula crithmoides</i> (with uneven surface)
	<i>Cichorium spinosum</i> (with more soil)
	<i>Glaucium flavum</i> (with more soil)
	<i>Frankenia laevis</i>

(annuals)	<i>Mesembryanthemum nodiflorum</i>
	<i>Sagina maritima</i>
	<i>Silene scdoides</i> (where liable to sea floods in winter)
	<i>Spergularia marina</i>
	<i>Frankenia pulverulenta</i>

Cliffs and steep slopes

Limestone cliffs may be nearly sheer or with steep rocky slopes, and exposed or sheltered. Sheer cliffs of up to 400 ft. (130 m.), with valleys intersecting the face, occur in the south west of Malta (Fig. 10). The upper parts naturally receive less salt spray than the lower, and their flora is much the same as inland cliffs. Plants are sparse, particularly on sheer and exposed cliffs. On the more dissected cliffs, and particularly the very steep slopes where there is some shelter, two composites occur in some abundance, *Inula crithmoides* near the water, and further from it, particularly below rocky places, *Cupularia viscosa*.

The sheer cliffs and steep slopes grade into the flatter slopes described above.

Typical species of the sheer cliffs and steep slopes include:—

<i>Agrostidium</i> spp. (not near the water)
<i>Capparis spinosa</i> (usually not near the water)
<i>Centaurea spathulata</i>
<i>Crithmum maritimum</i>
<i>Cupularia viscosa</i>
<i>Hypericum aegypticum</i>
<i>Inula crithmoides</i>
<i>Statice tricuspidata</i> (rocky places near the water)
<i>Periploca laevigata</i> (locally common in the south-east of Malta and Gozo)

Shores with deposited sediments

There are only a few bays and inlets which are sufficiently sheltered for sand or mud to accumulate. Since the land area of the Maltese Islands is small and the rock mainly limestone, the amount of eroded sediment available for deposition is also small. Consequently these habitats are limited in extent and never reach far inland.

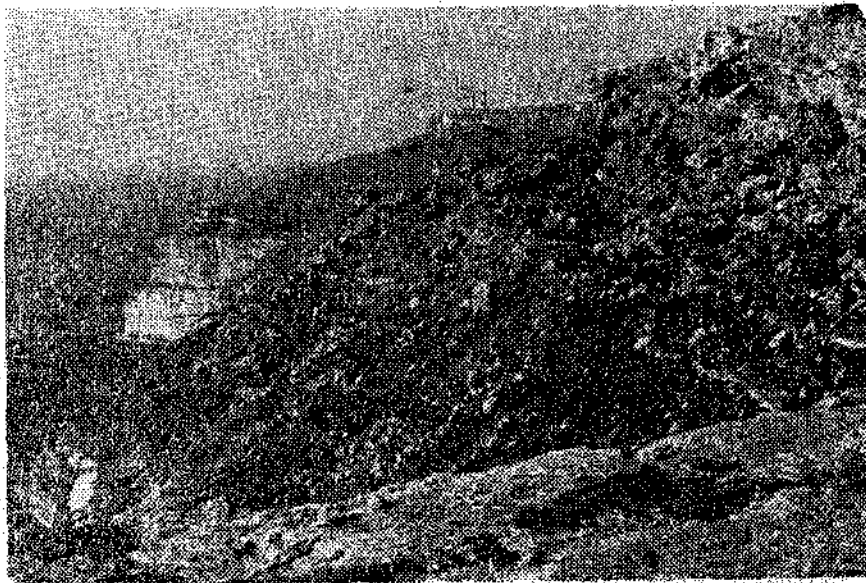
Sandy shores

The submerged species *Posidonia oceanica* is common on the sandy bottoms of many small bays and inlets.

The largest beach is at Ramla in Gozo, where sand dunes develop, and there is a succession from bare sand to stabilised dunes, and to tamarisk scrub. Elsewhere the beaches are smaller, and topography and human interference allow only fragments of these communities to occur. The 'dunes' in Malta are best developed at Ghadira (Fig. 12). Sandy beaches occur also at Golden Bay, St. Pauls' Bay, Ramla tal Torri, Għeina, and in various other bays on the north-west of the Island, and small inlets with some sand are also scattered in this area, e.g. Bahar iċ-Ċagħaq, St. Julian's Bay.

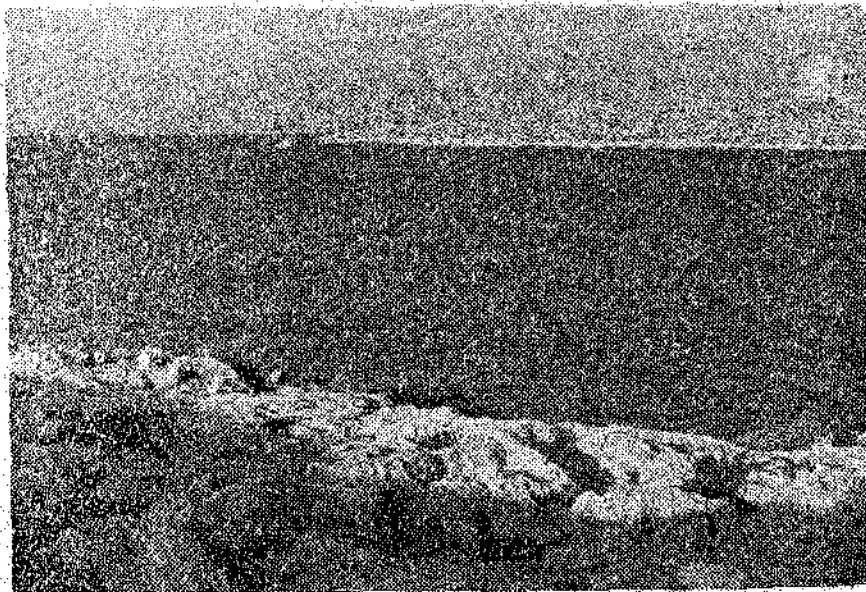
Because the (less disturbed) sand habitats are so limited, the characteristic species, though often abundant on one or more beaches, are infrequent in the Maltese Islands as a whole.

The sand, like the other soils, is calcareous. Bare sand is very unstable, easily blown by wind, moved by waves and disturbed by trampling. It is also deficient in organic matter. Only a few species can grow in such habitats, *Cakile maritima* (common at Ghadira) and *Eryngium maritimum* (common at Golden Bay) are



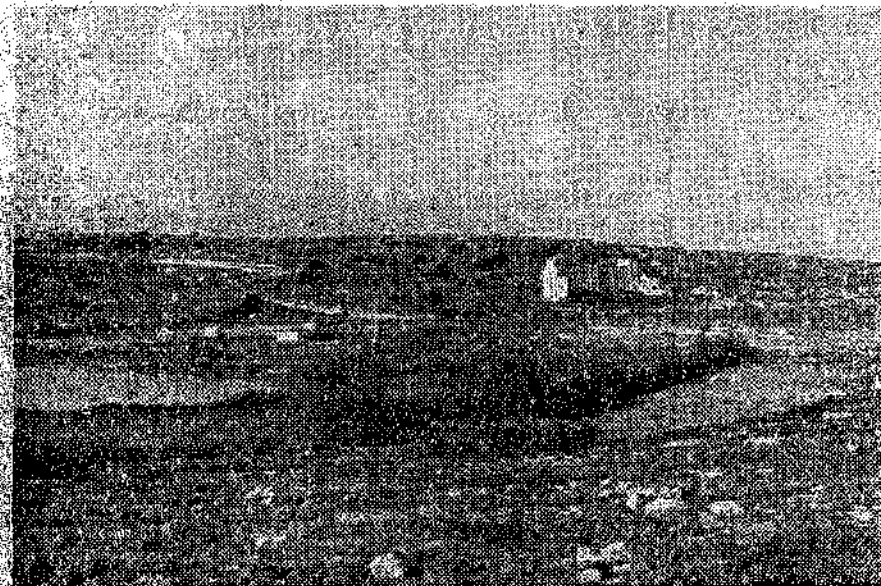
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Fig. 10. A view of the Dingli Cliffs from 'Ta' zuta to show the two tiers of Upper and Lower Coralline cliffs, the 'rdum' slope between. The foreground is of Upper Coralline karst with dwarf bushes of *Thymus capitatus*, *Erica multiflora* and *Euphorbia spinosa*. The dark trees of *Ceratonia siliqua* stand out below the Upper Coralline cliff and on the lower slopes of *Globigerina* there are many rounded shrubs of *Euphorbia dendroides*.



P.A.W.

Fig. 11. The sloping rocky shore at Qalet Marku showing uneven surface with shrubby plants of *Inula crithmoides* and *Suaeda vera*.



J. Sultana

Fig. 12. The saltmarsh and remains of sand dune system at Ghadira. The dark shrubs at the edge of the saltmarsh on the left are *Inula crithmoides* with *Phragmites* behind. *Tamarix africana* occupies the older dune and saltmarsh vegetation towards the right. In the foreground there is an area of Coralline rocky plateau.

two of these. When a strand plant becomes established, it impedes the movement of sand by the wind, and a hummock develops. When the wind direction changes, the hummocks are blown away and built up in another direction. Most of this scattered vegetation is ephemeral. At Ghadira (Fig. 12), for instance, all the strand plants on the coastal side of the road are likely to be moved and killed by autumn storms, and many are killed by trampling.

At Ramla in Gozo, however, *Ammophila arenaria* colonises the bare sand in land of the strand plants. This species is a most efficient stabiliser of sand. It has creeping rhizomes and long roots which bind sand, and a habit permitting vertical growth after the plant has been buried in sand. Consequently, with sand continually being blown inshore, and caught amid the tall leaves of *Ammophila*, dunes of over 5 m. high have been built up. At Ghadira, which has a road and car park in the centre of the sand area, the tallest dunes (behind the car park) barely reach 1 m. Elsewhere in Malta, although sand stabilised with grass can occur at the back of beaches, it is too flat to be termed dunes. Because of the human interference at Ghadira, the dunes are being eroded by wind and trampled faster than they are being built up. The performance of *Ammophila* is often poor, and rhizomes and roots can be seen exposed on some dunes.

Other species of the open sand dune habitat include:—

<i>Agropyron junceum</i>	<i>Medicago murina</i>
<i>Ambrosia maritima</i>	<i>Ononis natrix</i>
<i>Eryngium maritimum</i>	<i>Pancreatium maritimum</i>
<i>Euphorbia paralias</i>	<i>Scolymus grandiflorus</i>
<i>Euphorbia terracina</i>	<i>Spergularia marina</i>

When sand has been stabilised by *Ammophila*, and little new sand is being deposited on the dune (the sand being deposited on the newer dunes nearer the sea), a firm soil surface can develop, which contains more humus, and permits the establishment of species unable to tolerate an unstable habitat. At the back of the stabilised dunes at Ramla, tamarisk scrub has developed. Tamarisk scrub also occurs independently of dune formation at e.g. St. Paul's Bay in Malta, St. Mary's Bay in Comino, and Pergla and San Blas in Gozo. It appears that, where there is less sand, and thus less instability of substrate, tree colonisation occurs close to the sea. At Ghadira, the scrub occurs on flat ground (behind the dunes).

Muddy shores

The submerged species *Zostera marina* is frequent on muddy bottoms of various bays and inlets.

Muddy shores, on which saltmarsh vegetation can develop, are sparser than sandy beaches. The best developed are at Salini and Ghadira (where the brackish water pool behind the car park is on mud). Remnants, much disturbed by human interference, occur at Marsaskala and Marsalforn, and smaller ones at Marsa (which had a similar basic habitat, but has been drained and converted to other uses). No other examples are large enough to be considered separately.

Even Salini and Ghadira are far from their natural state. At Salini the salt pans, the road and associated disturbance separating salt from freshwater habitats, the Kennedy Grove, and the trampling associated with free public access, mean that only a small area of salty mud now remains. At Ghadira, the ground immediately around the pool is somewhat disturbed, and leads into agricultural or non-muddy habitats.

The Ghadira pool is below sea level, so salt water presumably percolates into it throughout the year. Salt is presumably also blown in. Rain water drains from the surrounding land. Consequently the water level is high during the rainy season, but low in late summer when the salt concentration is high and a thin crust of it is left on the dried out edges of the pool.

Mediterranean sea water contains c. 3.7% of salts. It is the high concentration of chloride ions which many species are unable to tolerate. The pool at Ghadira can have chloride levels well above those of the sea (when evaporation in dry weather concentrates the salt), though the marshy area usually has less salt than sea water.

Salty, muddy pools towards the sea at Salini contain the submerged species *Ruppia maritima*.

Mud in salty, but unflooded (or barely-flooded) areas at Ghadira and Salini are colonised by *Salicornia ramosissima*. Rather higher ground tends to be less salty, because rainwater leaches the salt from the soil. *Juncus acutus* and *Spergularia marina* occur with and outside the outer *Salicornia ramosissima* zone at Ghadira and *Juncus maritimus* and *Suaeda vera* do so at Salini. *Phragmites australis* (reedswamp) is common to the west of the pool at Ghadira, and over much of the mud and higher ground at Salini. It grows well in up to c. 1.2% chlorinity in the soil water, and so occurs where the salt has been diluted by the addition of fresh water or by leaching from dry soil.

Inula crithmoides is common on drier ground outside the most salty areas. Tamarisk scrub is likewise common on the drier and less salty parts at Ghadira,

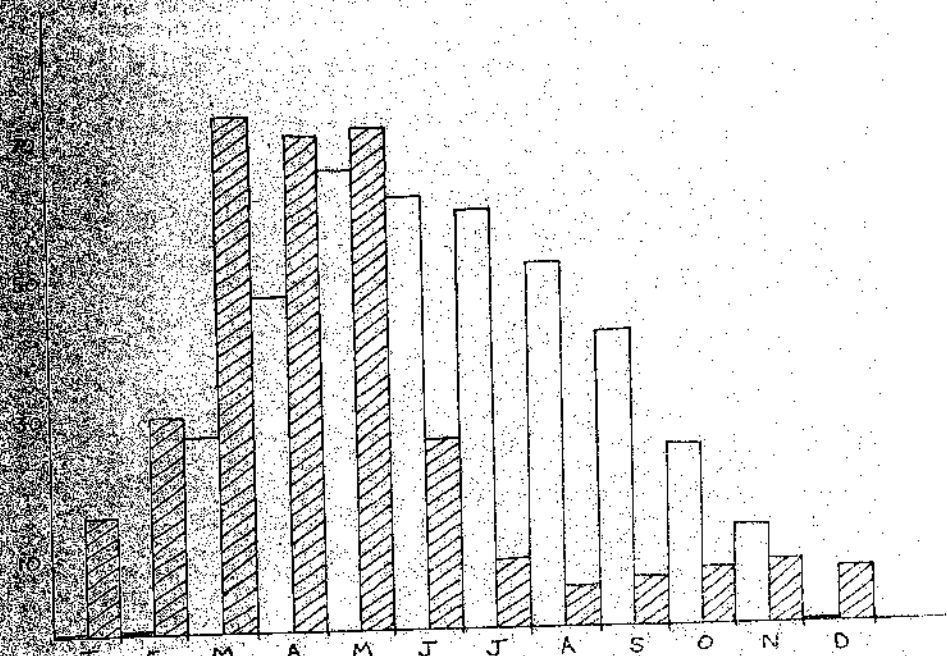


Fig. 13. Number of species, expressed as %, flowering throughout the year on the coralline plateau (hatched bars) and the seashore (white bars).

and may be the final stage in the succession of both saltmarsh and sand dune vegetation.

Other species occurring in the saltmarsh habitat include *Puccinellia fasciculata*, *Salsola kali*, *Salsola soda*, *Suaeda maritima* and *Triglochin bulbosa*.

Slopes with soil

Soil-covered slopes are not contiguous with the sea: they occur only above one of the other types of maritime vegetation described above. Yet the bands of almost bare rock, salty mud or sand may be narrow, and salt spray regularly reach further inland. These habitats bear most of the typical species of the inland vegetation appropriate to the habitat (karst, valley etc.), but, in addition, coastal plants occur.

These include:—

<i>Beta vulgaris</i> subsp. <i>maritima</i>	<i>Lygeum spartum</i> (Clay)
<i>Cichorium spinosum</i> (karst, deep soil)	<i>Mesembryanthemum nodiflorum</i>
<i>Glaucium flavum</i>	<i>Pseudostachya pumila</i>
<i>Inula crithmoides</i>	<i>Spergularia marina</i>

Coastal Blue Clay slopes

An infrequent but very characteristic habitat is the steep slopes of Blue Clay facing the sea. They occur at e.g. Gnejna and Ghajn Tuffieha in Malta, and e.g.

from Ramla to Marsalforn in Gozo. The soil is unstable. Because of the steepness of the slopes it moves downhill with winter rain, and cracks in the summer sun. Eroded gullies are widespread. On the steepest slopes with most erosion, higher plants are very sparse indeed, and even with more shelter and stability the cover falls far short of 100%.

Lygeum spartum is the characteristic and most abundant species. This species is not found inland. Since the slopes with *Lygeum* extend well over 100 m. from the sea, they cannot properly be classified as maritime.

The species list is very small, the habitat extremely rigorous.

Species present include:—

<i>Anthemis secundiramea</i>	<i>Limonium reticulatum</i>
<i>Beta vulgaris</i> subsp. <i>maritima</i>	<i>Oxalis pes-caprae</i>
<i>Hedysarum coronarium</i>	<i>Pallenis spinosa</i>
<i>Paula crithmoides</i> (towards the sea)	<i>Picris echioides</i>

Coralline plateaus

These areas are shown on Fig. 8 and occupy most of the north and west of Malta, the south and east of Gozo and the whole of Comino. They consist of rocky exposed areas (Fig. 14) in which any soil or vegetable remains are blown away in the frequent strong winds leaving isolated pockets of soil protected by boulders. Similar pockets are left after the evaporation of the winter pools. During the rainy months water falling on the rocky surface either runs off, passes through the rock or remains in pools. The pools are evaporated by the summer sun during April and May. During the dry months of April to September inclusive (that is when $2T$ is equal to or greater than P as defined in UNESCO-FAO Bioclimatic map 1969), where P = precipitation (rainfall etc.) and T = evapotranspiration, the plateaus are arid regions of intense heat with little apparent vegetation. When the autumn rains arrive in September or occasionally not until October every suitable place is occupied by a growing plant. The flowering period of these plants is at its peak in March, April and May (Fig. 13) so that fruit is produced during the early summer, and most remains dormant until the rainy season (see Zohary, 1962).

The plant community of the plateaus consist of deep-rooted shrubs of a xeromorphic nature, annuals and geophytes which only appear during the growing season of October to May, and perennials that are adapted to surviving the dry season. The shrubby species are almost all dwarf or kept so by grazing. They include:—

<i>Anthyllis hermanniae</i>	<i>Micromeria microphylla</i>
<i>Euphorbia spinosa</i>	<i>Phagnalon rupestre</i>
<i>Fumana thymifolia</i>	<i>Teucrium fruticans</i>
<i>Jasione glutinosa</i>	<i>Thymus capitatus</i>

When the rock surface becomes inaccessible to goats or protected from the wind (as where the rock dips steeply into a valley) several more shrubby species are found i.e.

<i>Erica multiflora</i>	<i>Rhamnus lycioides</i>
<i>Euphorbia dendroides</i>	<i>Rubus ulmifolius</i>
<i>Phlomis fruticosa</i>	<i>Teucrium flavum</i>

Some shrubby species in this category are now rare:—

<i>Cistus incanus</i>	<i>Myrtus communis</i>
<i>Cistus monspeliensis</i>	<i>Rosmarinus officinalis</i>
<i>Coronilla valentina</i>	



P.A.W.

Fig. 14 Coralline plateau (829 ft.) at Dingli with plants of *Asphodelus aestivus* and *Urginea maritima*. Shrubby species include *Thymus capitatus*, *Teucrium fruticans*, *Asperula cynanchica*, *Prasium majus*, *Phagnalon rupestre* and in the distance *Phlomis fruticosa*. *Brachypodium vetustum* occupies the pockets of earth. Two species characteristic of this coastal plateau and not inland are *Hypericum aegyptiacum* and *Crucianella maritima*.

There are only two trees, *Ceratonia siliqua* and *Ficus carica*, which may be found naturalised on open and exposed plateaus.

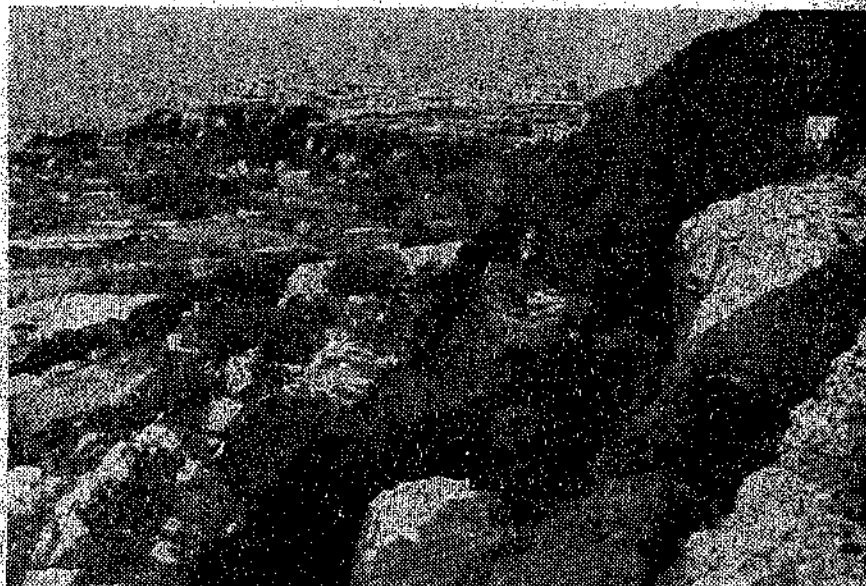
Perennials frequent on the Coralline plateaus and slopes include:—

<i>Anthyllis tetraphylla</i>	<i>Mentha pulegium</i>
<i>Anthyllis vulneraria</i>	<i>Ruta chalepensis</i>
<i>Asperula cynanchica</i>	<i>Sanguisorba minor</i>
<i>Ferula communis</i>	<i>Foeniculum vulgare</i>

In this category the most conspicuous species in summer are the thistle-like plants including *Carlina lanata*, *Carthamus lanatus* and *Carlina gummifera*.

There are numerous annual species whose seeds remain dormant throughout the summer months. Those that occupy the freshwater pools during the winter months must have completed their life cycle by April to May when the pools become dry. These include:—

<i>Crassula vailantii</i>	<i>Damasonium alisma</i>
<i>Callitriche</i> spp.	<i>Elatine hydropiper</i>



P.A.W.

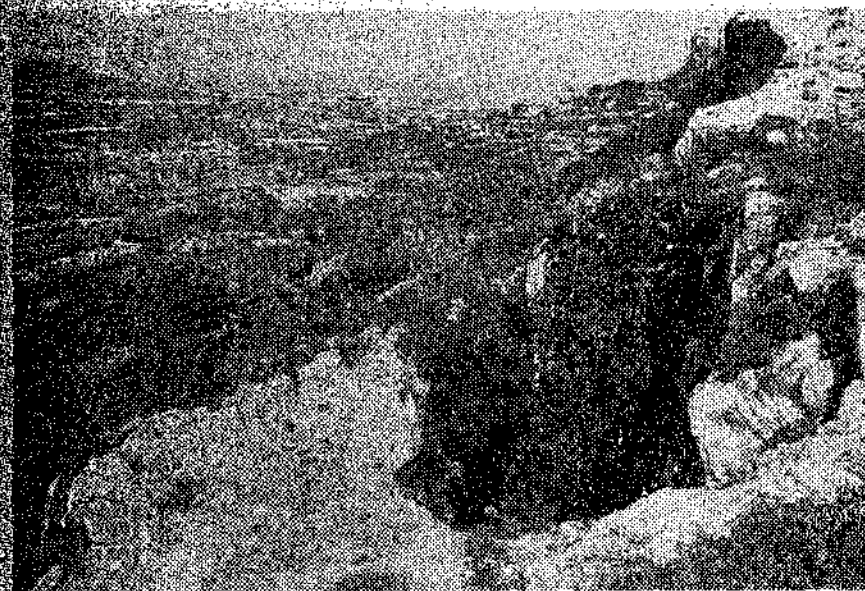
Fig. 15. Spring line and 'rdum' area below an Upper Coralline scarp at Mtaria. Trees and shrubs include *Laurus nobilis*, *Crataegus azarolus*, *Pistacia lentiscus*, *Teucrium fruticans* and *Erica multiflora*. Climbers include *Smilax aspera*, *Hedera helix*, *Asparagus aphyllus* and *Galium aparine*.

Other annuals occupy the small pockets of earth or the shallower pools as they dry out. Germination may occur over a long period during the rainy season and was still occurring in March on areas investigated during 1968 by Welseley (see Zohary 1962). Those germinating late in the rainy season are often unable to complete their life cycle as the arrival of the dry season is quite sharply defined, see Figs. 2, 3, 4, and although the perennials are able to make use of water in the rock, the shallow-growing annuals are in pockets of earth that are dried out very rapidly. These species include:—

<i>Bellis annua</i>	<i>Plantago coronopus</i>
<i>Evax pygmaea</i>	<i>Ranunculus bullatus</i>
<i>Linum gallicum</i>	<i>Sedum caeruleum</i>
<i>Lotus creticus</i>	<i>Trifolium stellatum</i>
<i>Lotus edulis</i>	<i>Trifolium suffocatum</i>

Geophytes are also abundant in this rocky habitat, spending the dry season as bulbs, corms, rhizomes or tubers. Some of these flower after the first autumn rains, before their leaves appear:—

Narcissus serotinus, *Urginea maritima*, *Spiranthes spiralis*.



P.A.W.

Fig. 16. The Upper Coralline scarp at Mtaria, showing the abrupt change from the coralline plateau to the sheltered 'rdum' spring line. Below this are terraced fields.

Others flower in the early spring from February to April:—

<i>Allium roseum</i>	<i>Iris sisyrinchium</i>
<i>Allium subnigrum</i>	<i>Ornithogalum pyramidale</i>
<i>Asphodelis aestivus</i>	<i>Romulea columnae</i>

Most of the orchids are found on the rocky plateaus and the dry slopes of the valleys. The commoner species include:—

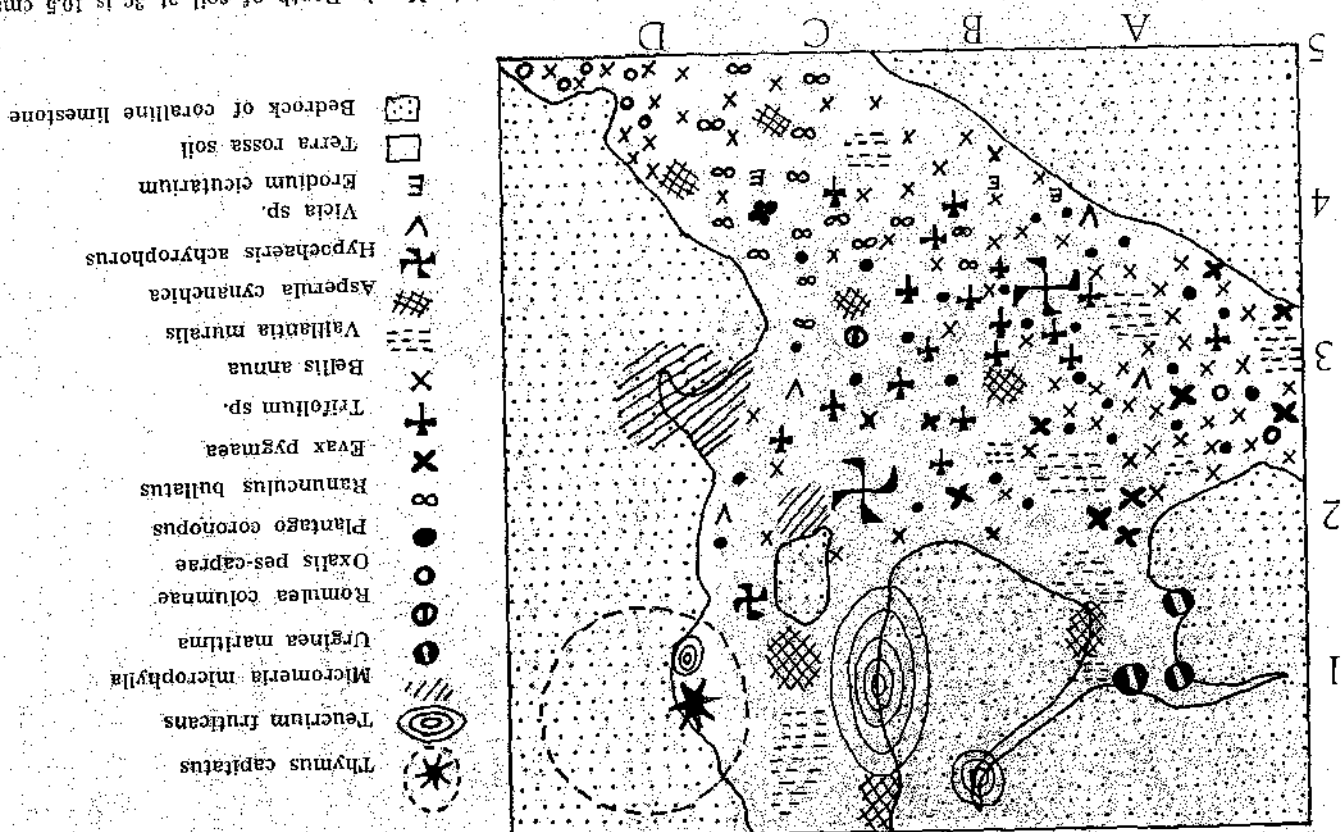
<i>Anacamptis pyramidalis</i>	<i>Orchis coriophora</i>
<i>Ophrys bombylifera</i>	<i>Serapias parviflora</i>
	<i>Ophrys fusca</i>

The distribution of species on an area of Coralline plateau at Ghar il-Kbir is shown in Fig. 17. This type of distribution may exist over large areas of the coralline plateaus or be found in small discontinuous areas as in field margins and roadsides.

Valleys and scarp edges of the coralline plateaus

There are numerous steep-sided valleys (Fig. 18) intersecting the coralline scarps and exposed areas of coralline in the south of Malta. The distribution of these and the coralline scarp edges is shown in Fig. 8. Rainfall during the winter months is often very heavy so that the valley bottoms are considerably disturbed by the run-off from the surrounding high lands, with large boulders along the

Fig. 17. 1 sq. metre of coralline plateau at Ghar il-Kbir. Species present in March. Depth of soil at 3c is 10.5 cms. and at 5d, 2 cms.



water-course and other water deposited matter. At the tops of their steep sides they often measure less than 300 yards across and up to 150 feet deep. This ensures protection from the wind and increased humidity in summer. For this reason as soon as the slopes become less steep they are terraced and used for agriculture as at Wied il-Ghasel.

In these protected valleys (Fig. 15) the majority of trees and shrubs found on the Maltese islands occur. Most of these species are now rare. They include:—

Myrtus foetida
Ceratogon azarolus
Cydonia monogyna
Cercidonia siliqua
Ligustrum complanatum
Olea europaea

Palurus spina-christi
Pinus halepensis
Ficus lentiscus
Populus alba
Quercus ilex
Rhamnus lycioides
Tetradlepis articulata

Introduced trees that are naturalised in some valleys include *Morus alba* and *Prunus domestica* subsp. *insititia*.

Associated with the tree species are several climbers:—

Asparagus aphyllus
Clematis cirrhosa
Hedera helix
Lonicera implexa

Rubia perigrina
Rubus ulmifolius
Smilax aspera

In the sheltered valley bottoms between the more arid valley sides and the bed of the water course there are several species that are uncommon elsewhere:—

Phagnolon australe
Phagnolon fruticosum
Cerastium robertianum
Cynoglossum creticum
Cerastium calceolipoda
Plantago major

Teucrium scordium
Tamus communis
Stachys cynosuroides
Scilla peruviana
Ranunculus ficaria

In and around the water course on the valley bottom may be found:—

Juncus foetidissima
Carex spp.
Apium nodiflorum

Samolus valerandi
Potentilla reptans
Polygonum semiterrestris

The steep edges differ very little from the valley bottoms (Figs. 14, 15) except that they are often more exposed as at the Dingli cliff edge and other coastal scarps. This is associated with a reduction in the number of rarer species found in the valleys. There are fewer trees and shrubs at the scarp edge (probably owing to the bordering agricultural regions) and a greater proportion of climbers particularly *Clematis cirrhosa* and *Hedera helix* which covers the scarp edge even on the coast as at Pengeja in Gozo.

Globigerina valleys

Where the valleys originating on the Upper Coralline cut through to the Blue Clay the sides slope more gently and are often terraced and managed agriculturally to the edge of the water course. The valley bottom is usually on Globigerina limestone and because the slope is not steep there is some accumulation of silt and many more herbaceous plants are found. Most trees and shrubs have been removed by man but there are a few rare species e.g. *Populus alba*, *Salix alba* and *Vitex agnus-castus*.

Some of the herbaceous species that are commonly found in these valley bottoms are:—

<i>Apium nodiflorum</i>	<i>Plantago lanceolata</i>
<i>Carex divisa</i>	<i>Plantago major</i>
<i>Cyperus longus</i>	<i>Polygonum lapathifolium</i>
<i>Juncus acutus</i>	<i>Ranunculus muricatus</i>
<i>Lythrum hyssopifolia</i>	<i>Rumex conglomeratus</i>
<i>Lythrum junceum</i>	<i>Scirpus holoschoenus</i>
<i>Panicum repens</i>	<i>Veronica anagallis-aquatica</i>
<i>Phragmites australis</i>	

Where there is standing water for a considerable period as at the Chadwick Lakes, created in 1890 and extended as recently as 1973, there are other species which can tolerate deep water for several months of the year and the ensuing summer drought. These are *Alisma lanceolatum*, *Ranunculus muricatus* and *Xanthium strumarium*, the latter being a recent introduction.

Globigerina slopes with deeper soil

The sides of most valleys in the Maltese Islands either have a shallow or intermittent soil cover, or are cultivated. Rarely, on the soft Globigerina-Lime stone a slope can occur with both a continuous soil cover and no cultivation at Delimara. Aspect can be important. At Delimara sea spray is blown further up the east facing slope than it is up the west-north-west slope. The east-facing slope is also likely to have the warmest soil, since sunshine reaches it earlier in the day. The vegetation on the two slopes differs considerably in both the species present and in their abundance. The slopes are intermittently grazed by cattle.

The most abundant plant is *Oxalis pes-caprae*. The species list is long, which is a common phenomenon in a stable habitat with good soil and moderate exposure, and forms a sharp contrast to the short species lists of the Blue Clay slopes.

Species present include:—

<i>Arisarum vulgare</i>	<i>Hedysarum coronarium</i>
<i>Carlina lanata</i>	<i>Isule crithmoides</i>
<i>Cichorium spinosum</i>	<i>Lobularia maritima</i>
<i>Diploaxis erucoides</i>	<i>Medicago</i> spp.
<i>Erodium malacoides</i>	<i>Pallenis spinosa</i>
<i>Galactites tomentosa</i>	<i>Pinardia coronaria</i>
<i>Plantago lagopus</i>	<i>Scilla peruviana</i>
<i>Pseudorhiza pumila</i>	<i>Silene colorata</i>
<i>Scabiosa atropurpurea</i>	<i>Urginea maritima</i>

Cultivated and waste places

History

The first traces of human occupation have been dated at 3800 B.C. (\pm 150 years). Although there are few architectural remains from the earlier periods (Fig. 20) from 3800 — 3200 B.C., there are remains of domesticated animals and cultivated species of crops, indicating that these people were already farmers. Animal bones include high numbers of goat and/or sheep, cattle of great size (more frequent in the early phases), pigs, and a small canid. Carbonised grain includes *Triticum dicocum* and probably *T. compactum*, *Lens culinaris* (Neolithic-anatolian type; seeds 2.60-3.25 mm. diameter), *Scorpiurus* sp. and *Sherardia arvensis* (Trump (1966)). There seems to be no complete break between these people and the temple-builders who occupied Malta during the next 1400 years. Their most



Fig. 18. Steep-sided valley at Wied il-Ghasel showing the boulder strewn bottom with trees of *Ceratonia siliqua* and *Prunus dulcis* on the lower sides.

conspicuous architectural remains are the gigantic temples that are found in many parts of Malta and Gozo. The absence of any domestic settlements lead to the speculation that Malta was a sacred island visited by pilgrims, but Trump's careful excavations at Skorba have shown almost continuous domestic occupation from the Ghazal-Balam phase 3800 B.C. to the Mgarr phase 2800 B.C. The domestic remains from this period seem to include those species already mentioned. During the Ggantija phase about 2600 B.C., horse, deer, cat (common) and dog (rare) were added to the list (Evans (1971)). The temples were stone-built and partially domed with a brushwood and clay roof. The brushwood at Skorba was of *Olea europaea*. Analysis of hearth fires gave the additional woody species *Cercis siliquastrum*, *Crataegus* sp. and *Fraxinus* sp. (Trump (1966)). The last two were probably native at that time, but became extinct and have recently been re-introduced.

The occurrence of crop plants suggests a form of field management and it is possible that some of the terracing in the rocky hills around the temple sites may have originated in prehistoric times. Evidence for early terracing is found in the

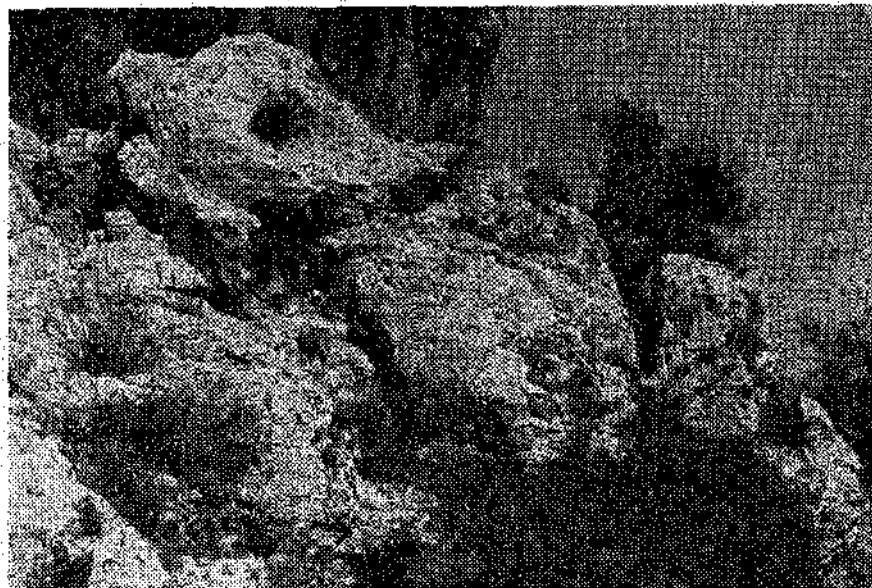


Fig. 19. Upper valley sides at Wied il-Ghasel with shrubs of *Euphorbia dendroides* and *Periploca laevigata*.



Fig. 20. Valley on Globigerina rock showing winter water-course bordered by fields. Photograph taken in January when the only conspicuous species in the valley bottom are *Rumex conglomeratus* and *Ranunculus muricatus*.

Negev, where water conservation was also a feature of the system. There is little evidence for water collection or storage in any scale during this early period, but there are cisterns associated with some of the temples. These are usually natural rock caves with stone covers as above Mnajdra. Although the crop plants could have been dry farmed, supplies for domestic animals and Man himself would need to have been conserved for the dry season.

There is a distinct break in the sequence between the temple builders and the subsequent Bronze Age occupants. These people have left a few areas where there are considerable domestic remains as at Borg in-nallur and Bahrija. Agricultural practices were continued and *Vicia faba* var. *celtica* appears for the first time (now one of the staple crops of the dry farmer). There is evidence that cisterns were used for grain storage or silos during this period at Nuffara, Gozo. These settlements appear to be more closely associated with a water source than in earlier periods. Bahrija for example is one of the few places where fresh water runs throughout the year. During this period, the architectural remains are reduced in scale, but still stone built. Roofing timbers (probably *Pinus halepensis*) used in the Tarxien Cemetery buildings gave a carbon dating of c. 1930 B.C. indicating that they were cut in a earlier period and reused by the Bronze-Age people. Wood must have already been scarce by 1600 B.C. Analysis of pollen grains in a Bronze-age cistern gave *Pinus* (scarce), *Olea* (common), *Scorpiurus* sp., *Plantago* sp. and a Composite (Trump, (1966)). The Phoenicians arrived in

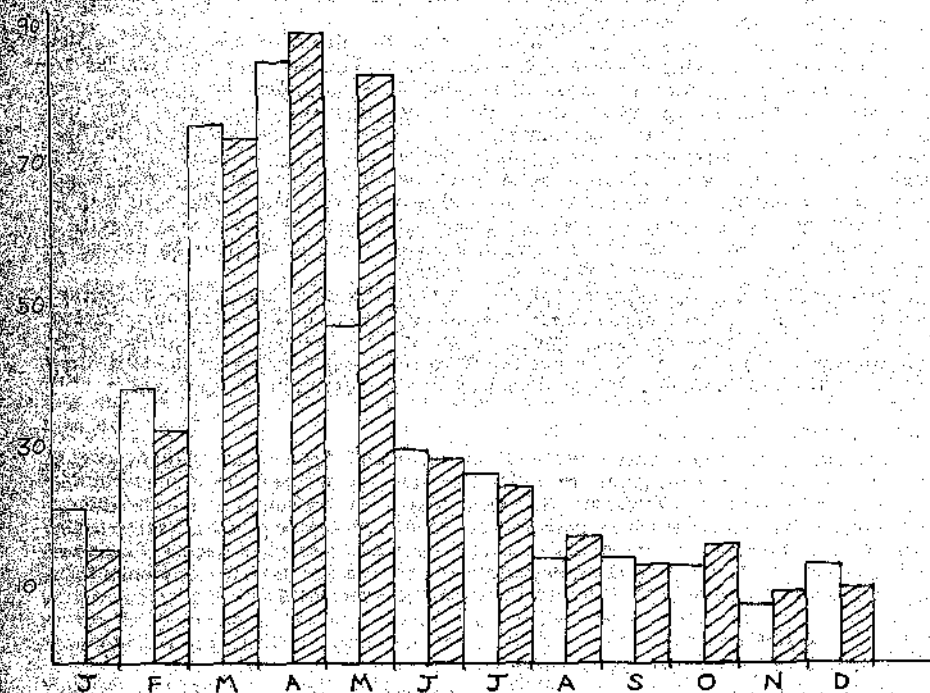


Fig. 21. Number of plant species, expressed as %, flowering throughout the year in ruderal places (hatched bars) and cultivated places (white bars).

800 B.C. and were dislodged by the Romans after the Carthaginian wars in the second century B.C. There followed a long period under Roman rule until the Islamic conquest of Sicily in the ninth century. Surprisingly, there is little information about this period and few remains apart from Punic tombs. During the time the grape became widely cultivated. The Arab occupation is similarly badly chronicled. During this period the orange and other citrus fruits were introduced and many vineyards destroyed.

Prior to the arrival of the Knights of St. John in 1530 the Normans, followed by the Aragonese held Malta for a short period. The architecture of the Knights is a magnificent feature of the Islands. However, during their stay vital food materials such as grain and vegetable oil were imported so that the town dwellers were not dependent on the local agricultural supply. They attempted to increase export products encouraging the growth of cumin and more particularly cotton for which many thousands (reputed to be 50,000) olive trees were cut down. When the cotton market collapsed in 1800, the decline in cotton growing began and has continued until the present day, though cotton is still very occasionally grown in Gozo. In 1800 the British were asked to take over after helping to oust Napoleon's few troops. It continued to be a military base dependent on imported food supply. Since Independence in 1964 large sums have been invested in irrigation schemes and glasshouses, but there are large areas of Malta and Gozo where the crops found in prehistoric times are still cultivated today. These farmers are more or less self-supporting gathering their seed each year for the following season and having little contact with the urban areas.

Land is divided according to Roman law on the death of the owner, so that many farmers have fields in several different areas. The fields on the hillsides are terraced and average half an acre; on the lowlands they may be up to 9 acres. The terraced fields were cut in the rocky slopes to give a horizontal field bed and a wall on the lower side. Smaller stones were left on the surface of the field bed and the whole covered with a thin layer of soil, often brought from other regions, as this was and still is a valuable commodity. Areas of the surrounding rock were frequently left undisturbed in and around the fields. The wall acts as a wind break and a rubbish dump for weeds. Clay terraced fields also require a wind break; and being unstable ground it is often more convenient to use reeds of *Arundo donax* or rows of *Opuntia ficus-indica*.

The small size of the fields and plots and their disjunct ownerships discourage the use of tractor-drawn agricultural machinery except in a few favoured areas. Consequently the horse or mule with a simple wooden plough is a familiar sight. The rotovator is now widely used, but owing to the inaccessibility of fields it often has to be carried for considerable distances along steep and rocky paths.

Cultivation and management

The annual rainfall occurs between September and April in most years leaving 5 months or more of continuous drought. Dry farming utilises the annual rainfall for crop production, usually leaving the land barren in the summer months though occasionally planted with a melon or tomato crop. The tapping of the water tables with wheels and wind pumps made intensive land use possible in areas that were not on the natural spring line. Wind pumps are frequently used to supplement the dry farming water supply in order to increase the crop yield.

Dry farming crops

Arable crops used mainly for fodder:—

<i>Cicer arietinum</i>	<i>Lens culinaris</i>
<i>Hedysarum coronarium</i>	<i>Scorpiurus muricatus</i>
<i>Hordeum vulgare</i>	<i>Triticum aestivum</i>
<i>Lathyrus ochrus</i>	<i>Vicia ervilia</i>
<i>Lathyrus sativus</i>	<i>Vicia sativa</i>

Arable crops used mainly for human consumption:—

<i>Pisum sativum</i>
<i>Lycopersicum esculentum</i>
<i>Solanum tuberosum</i>
<i>Vicia faba</i>

These crops used for fodder are often picked and fed green, as and when they are frequently sown in small very poor areas where there is a large percentage in the native weed species, particularly *Leguminosae*, which are gathered at the rest of the crop.

Hedysarum coronarium is cut in flower in April, dried, and kept as summer fodder. This is frequently alternated annually with grains.

Vegetables introduced in the early 19th Century are now one of Malta's exports and are grown in irrigated areas as well as by dry farming, giving several crops a year. The Tomato (*Lycopersicum esculentum*) is treated similarly and is usually grown under glass.

Fruit trees and shrubs grown under dry-farming conditions include:—

<i>Opuntia ficus-indica</i>
<i>Prunus dulcis</i>
<i>Prunus persica</i>
<i>Punica granata</i>
<i>Vitis vinifera</i>

Vitis vinifera is cultivated as a field crop as was *Olea europaea*. Today an olive grove is a rare sight in the Maltese Islands although there have been recent attempts to establish young trees in large areas of barren Upper Coralline in the north-west of Malta (e.g. Bajda and Marfa ridge) and at Xewkija in Gozo. These are cultivated chiefly in the hilly western districts of Malta, both on the Coralline plateaus and the Blue Clay slopes. Elsewhere they are grown in small quantities for the farmers' consumption. Both these fruit crops are intercultivated with arable crops, usually sulla or wheat.

Opuntia ficus-indica is cultivated as a wind-break for fodder and the fruits may be consumed. The other species are grown individually or in small groups around farmsteads and field margins. The dark green windswept trees of Carob (*Ceratonia siliqua*) are a constant feature of the Maltese landscape. Amongst the other trees the predominance of the female tree testifies to the management of this species for its crop of fodder beans, one male tree being left in a large area of female trees.

Irrigated crops

The traditionally irrigatable land was on the clay slopes below the upper water table whose supply was tapped at local springs and shared between several farmers. At San Blas in Gozo each farmer had use of the spring one day in seven. Both the natural spring water and the pumped water require a system of irrigation. This is commonly done with limestone ducts built along the walls of the fields or as a raised aqueduct as at Hofriet ir-Rizz. The water is then channelled along the field into the grids made for each plant or tree.

Vegetable crops grown under irrigation include:—

<i>Fragaria</i> spp.
<i>Lactuca sativa</i>
<i>Lycopersicum esculentum</i>
<i>Solanum tuberosum</i>

Fruit trees usually grown under irrigation include:—

<i>Citrus aurantium</i>	<i>Citrus sinensis</i>
<i>Citrus deliciosa</i>	<i>Eriobotrya japonica</i>
<i>Citrus limetta</i>	<i>Malus domestica</i>
<i>Citrus limon</i>	<i>Pyrus communis</i>

Early fruiting species and varieties of the latter three are occasionally found in dry farming areas. Many fruit trees are intercultivated with vegetable crops.

Animal husbandry

Sheep and goats are the only livestock visible in the Maltese country-side, about 80% of these animals being pastured on the Coralline plateaus (Xaghri) (Bowen-Jones et al (1960)). Other livestock such as cattle, horses, mules, pigs, poultry and rabbits are kept in some form of enclosure and fed chiefly with green fodder pulled from the fields and roadsides. Where intensive agriculture has been implemented, cattle and pigs are kept in larger numbers and fed on imported foodstuffs.

Weeds

24% of the flora of the Maltese Islands occur as weeds of cultivation and 16% as weeds of waste places. This very high proportion is associated with the length of time Man has been on the Islands and the agricultural practices of the region. In many places there is no sharp boundary between the species of the disturbed areas and the flora associated with undisturbed areas as it may survive in rocky islands in fields, field margins, roadsides and urban areas. Species of a particular habitat (i.e. karstland) are frequently found associated with typical weeds.

Cultivated land

Cultivated land may suffer up to four disturbances or more per annum if the land is irrigated. It is not surprising that the annual habit is also prevalent among the weed species; six annuals to one perennial.

Those perennials that occur as weed species are able to survive the summer drought as a bulb or rhizome e.g. *Gladiolus italicus*, *Muscari comosum* and *Anemone coronaria*.

The flowering periods of the weed species are shown in Fig. 21. As most crops are removed by the end of April there is a sharp drop in the numbers of weed species flowering between April and May, 113 species in April to 44 in June. The latter number includes weed species of irrigated ground that often flower throughout the year, species flowering after the harvesting of the crop or species occurring when there are summer crops on the land.

The early flowering annuals include some of the most conspicuous weed species in the Maltese Islands:—

<i>Brassica rapa</i> — yellow	<i>Oxalis pes-caprae</i> — yellow
<i>Diplotaxis erucoides</i> — white	<i>Silene colorata</i> — pink

Other common early flowering weed species include:—

<i>Lamium amplexicaule</i>	<i>Adonis annua</i>
<i>Lathyrus articulatus</i>	<i>Astragalus boeoticus</i>
<i>Lathyrus cicera</i>	<i>Avena barbata</i>
<i>Malva sylvestris</i>	<i>Avena sterilis</i>
<i>Medicago litoralis</i>	<i>Biscutella didyma</i>
<i>Medicago orbicularis</i>	<i>Bromus madritensis</i>
<i>Medicago polymorpha</i>	<i>Calendula arvensis</i>
<i>Medicago truncatula</i>	<i>Convolvulus arvensis</i>
<i>Melilotus messanensis</i>	<i>Emex spinosa</i>
<i>Melilotus segetalis</i>	<i>Erigeron crispus</i>
<i>Melilotus sulcata</i>	<i>Erodium malacoides</i>
<i>Papaver dubium</i>	<i>Euphorbia peplus</i>
<i>Papaver rhoeas</i>	<i>Fumaria densiflora</i>
<i>Pinardia coronaria</i>	<i>Fumaria gaillardotii</i>
<i>Plantago afra</i>	<i>Fumaria parviflora</i>
<i>Portulaca oleracea</i>	<i>Galactites tomentosa</i>
<i>Raphanus raphanistrum</i>	<i>Hippocrepis multisiliquosa</i>
<i>Reseda alba</i>	<i>Hordeum leporinum</i>
<i>Trifolium nigrescens</i>	<i>Scorpiurus muricatus</i>
<i>Urtica urens</i>	<i>Sonchus oleraceus</i>
	<i>Tordylium apulum</i>

The perennial species mentioned also flower early.

Those species that are in flower after the crop has been removed include:

<i>Ammi majus</i>	<i>Mentha pulegium</i>
<i>Delphinium halteratum</i>	<i>Ridolfia segetum</i>
<i>Hypericum crispum</i>	

There are fewer species of weeds of irrigated land, but each species will often occupy large areas of land. They include:

<i>Amaranthus retroflexus</i>	<i>Polygonum convolvulus</i>
<i>Chenopodium album</i>	<i>Portulaca oleracea</i>
<i>Convolvulus arvensis</i>	<i>Setaria viridis</i>
<i>Cynodon dactylon</i>	<i>Stellaria neglecta</i>
<i>Heliotropium europaeum</i>	<i>Urtica dubia</i>
<i>Lamium amplexicaule</i>	

Achusa italica is characteristic of fields on the clay and *Linaria triphylla* of those on Globigerina Limestone.

Orobancha crenata is a serious parasite of *Vicia faba* causing wilt and diminishing production of beans. The failure to burn infected plants results in the rapid spread of the species. *Oxalis pes-caprae* is frequently used for grazing; but it contains a compound detrimental to the animals digestive system. *Cynodon dactylon* is a weed of general occurrence which reduces the yields of tree crops, such as *Citrus*, considerably.

Abandoned fields have become a common occurrence during the past few years and these develop a characteristic flora if they are sufficiently protected from the wind and consequent soil erosion. A field above Buskett abandoned for three years included many more perennials such as *Cupularia viscosa*, *Asphodelus fistulosus*, *Ferula*, *Phagnalon rupestre*, *Daucus carota*, *Carthamus lanatus* and *Sanguisorba minor*. In areas sheltered from the wind by walls there were several shrubby species, *Rhamnus alaternus*, *Pistacia lentiscus*, *Prasum majus*,

Crataegus azarolus, *Rosmarinus officinalis* and *Hedera helix*. There were also young plants of *Cupressus sempervirens*, *Pinus halepensis* and *Quercus ilex*. The shrubs and young trees were established in places that had not been disturbed by the plough for a longer period than three years. Parent trees were present in the Buskett valley.

Other species associated with fallow or abandoned fields include *Linum strictum*, *Silene colorata*, *Medicago* sp. and *Lathyrus* sp., *Trifolium nigrescens*, *Trifolium campestre*, *Tetragonolobus purpureus*, *Bellardia trixago*, *Parentucellia viscosa*, *Stipa tortilis* and *Bromus* sp.

Waste places

Urban and other disturbed areas are widespread in the Maltese Islands. Many of the 16% ruderal species occur frequently all over the islands. Waste places include urban areas, buildings and building sites, rubbish dumps, quarries, harbours, footpaths and roadsides, and the dry stone walls that surround every small field and orchard on the islands.

In these sites the nature of the disturbance affects the species that are able to survive. Where there is constant root disturbance and burial as in rubbish dumps there are many species. These include:—

<i>Avena barbata</i>	<i>Hyoscyamus albus</i>
<i>Borago officinalis</i>	<i>Mercurialis annua</i>
<i>Bromus</i> spp.	<i>Pimardia coronaria</i>
<i>Echallium elaterium</i>	<i>Silybum marianum</i>
<i>Euphorbia helioscopia</i>	<i>Urtica pilulifera</i>
<i>Galactites tomentosa</i>	

Many species in this category also occur commonly on cultivated ground.

In urban areas conditions may vary considerably from month to month and year to year. The annual habit with its rapid and plentiful seed production is prevalent on pavements and areas much used by humans. The following species are frequent.

<i>Anagallis arvensis</i>	<i>Parietaria lusitanica</i>
<i>Aster squamatus</i>	<i>Poa annua</i>
<i>Bromus madritensis</i>	<i>Sagina apetala</i>
<i>Erodium malacoides</i>	<i>Sagina maritima</i>
<i>Euphorbia chamaesyce</i>	<i>Setaria viridis</i>
<i>Galium verrucosum</i>	<i>Sisymbrium irio</i>
<i>Hordeum leporinum</i>	<i>Sonchus oleraceus</i>
<i>Malva sylvestris</i>	<i>Urtica urens</i>

In built up areas there may be places where shrubby species can survive undisturbed from year to year, destruction being an occasional phenomenon, as on a vacant building site. *Nicotiana glauca* and *Solanum nigrum* are common in these places. *Ailanthus altissima* and *Ricinus communis* may also occur.

On footpaths and roadsides there is a constant wear on the aerial parts of the plant. The perennial or biennial plant with a well developed root system is common in this category and includes:—

<i>Convolvulus althaeoides</i>	<i>Plantago coronopus</i>
<i>Erodium malacoides</i>	<i>Plantago serraria</i>
<i>Erodium moschatum</i>	<i>Psoralea bituminosa</i>
<i>Galactites tomentosa</i>	<i>Salvia verbenacea</i>
<i>Lactuca virosa</i>	<i>Scabiosa atropurpurea</i>
<i>Lobularia maritima</i>	<i>Silene vulgaris</i>
<i>Malva parviflora</i>	<i>Verbascum sinuatum</i>
<i>Malva sylvestris</i>	<i>Verbena officinalis</i>
<i>Oxalis pes-caprae</i>	

Other species that have an annual habit and commonly occur in this habitat are:—

<i>Borago officinalis</i>	<i>Erodium cicutarium</i>
<i>Chenopodium murale</i>	<i>Geranium molle</i>
<i>Conyza bonariensis</i>	<i>Silene nocturna</i>
<i>Cupularia graveolens</i>	<i>Silene sericea</i>
<i>Echium parviflorum</i>	

Species occupying the walls are usually perennials and include:—

<i>Antirrhinum majus</i>	<i>Euphorbia pinea</i>
<i>Antirrhinum siculum</i>	<i>Oxalis pes-caprae</i>
<i>Convolvulus althaeoides</i>	<i>Parietaria lusitanica</i>

Where the walls are within reach of sea spray (e.g. Valletta and Floriana bastions), many of the species that occur on cliffs are found, including some that are uncommon there such as *Cherianthus cheirii* and *Matthiola incana*.

The flowering period of species in waste places is shown in Fig. 21. It is significantly later than that of weed species of cultivated places. Disturbances of a man-made environment show little annual pattern and the flowering period is more similar to that on the Coralline karst where the perennial habit is also favoured.

Geographical Relationship of the Maltese Flora

The sedimentary rocks and clays of the Maltese Islands were laid down during the Miocene period of the Tertiary at a time when the adjacent land area was covered with sub-tropical vegetation. During the later Tertiary and parts of the Pleistocene, the Maltese Islands were part of a land-bridge between Europe and North Africa dividing the Mediterranean into East and West basins. During the colder periods of the Pleistocene glaciations, this became a migratory route to the warmer south via Sicily and Italy. This is demonstrated by the fossil remains at Ghar Dalam which include Pygmy Elephant, Dwarf Hippopotamus, swans, turtles and later horses and deer, in numbers that could not exist on the small land surface available today. The land bridge remains as a submarine ridge which towards Sicily is only around 50 fathoms below the surface. Any fluctuations in sea level would affect the Islands' land surface considerably. Remarkable fluctuations in Mediterranean sea level occurred during the glacial phases of the Pleistocene due to isostasy (locking up of water in the ice caps) and eustasy (tilting of the adjacent continental coast line due to the weight of ice on the ice-caps). The raised beaches in the Mediterranean regions suggest that the Straits of Gibraltar may have been formed after a heightened sea level overflowed at this point. The combined effects of these phenomena caused variations in the sea level in the region of 100 m. (Raikes, 1967). Raikes considers that the present sea levels were not established until c. 4000 B.C. at the earliest.

Today, Malta occupies a central Mediterranean position with a characteristically Mediterranean climate — that is a summer dry period of up to 7 months and a winter wet period with temperatures that do not fall below 0°C. (Fig. 2). During the summer dry period the humidity is frequently high. This factor was taken into account when constructing the bioclimatic map of the Mediterranean zone (Fig. 22). The Mediterranean climate is shown to be bordered on the North by a mountainous cold winter region and on the south by a dry desert region. To the west it continues to the Canary Islands. The Mediterranean region is essentially coastal and was botanically defined as including those species found within 100 km. of the coast (Fl. Eur. Symp. no. 5). According to climatic conditions it can extend up to 300 km. inland as in Spain and North Africa. The distribution of *Nerium oleander* (Fig. 23) closely follows the bioclimatic limits of the Mediterranean region.

Fig. 22. Bioclimatic map of the Mediterranean zone.

Fig. 22

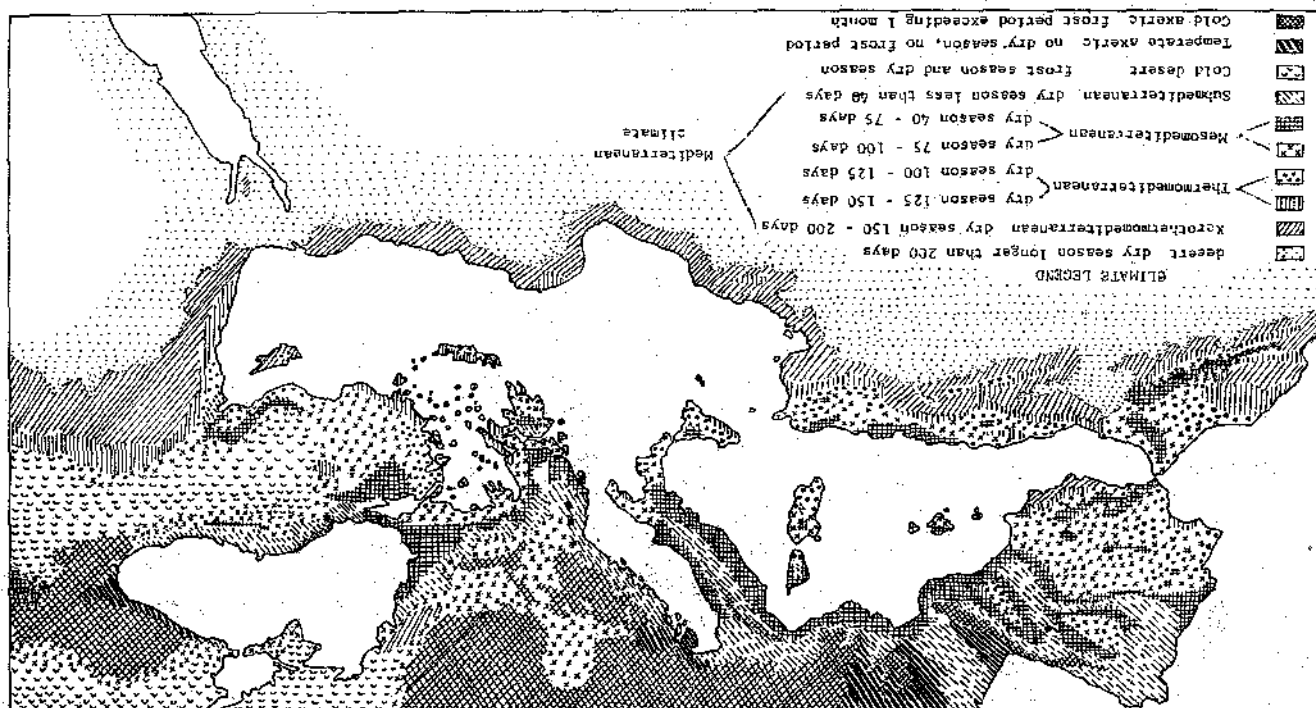


Fig. 24

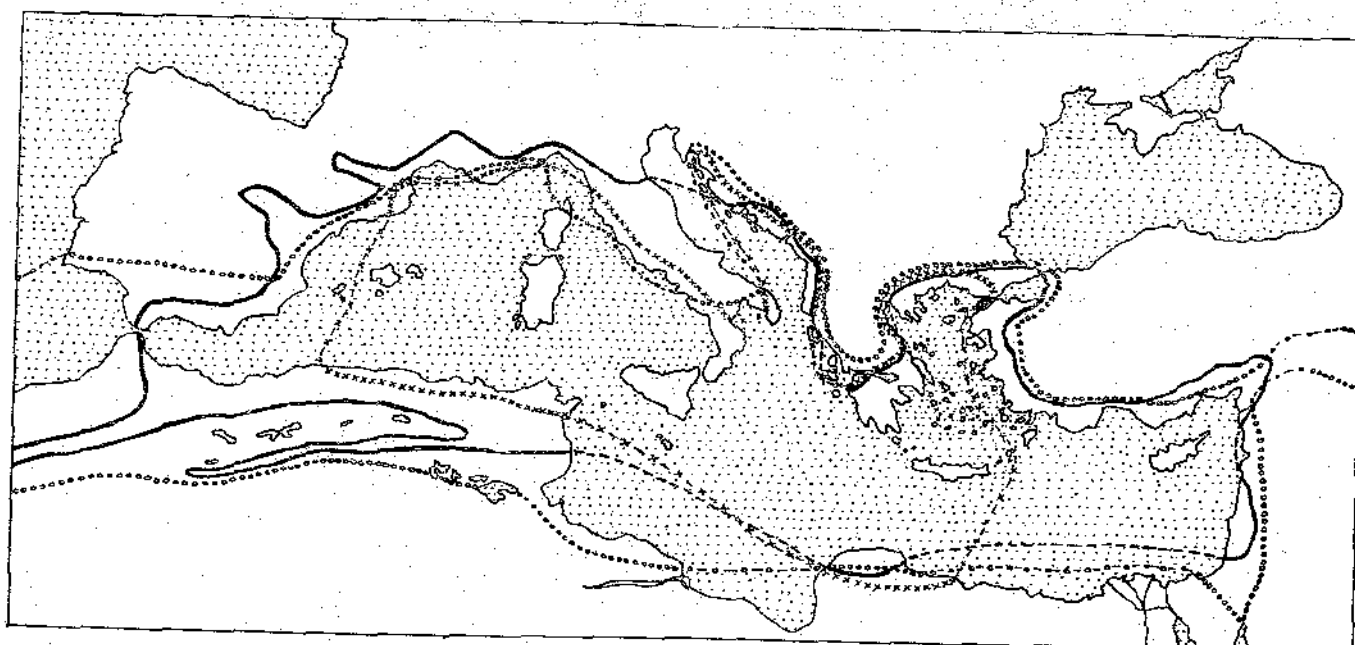


Fig. 24. Distribution of *Cynomorium coccineum* XXX, *Nerium oleander* oooo and *Pinus halepensis*.

The distribution of endemic tree species in the Mediterranean is a guide to the climatic conditions, but the picture is complicated by Man's long term destruction of forest trees for fuel and agricultural purposes and the nature of their dispersal when reintroduced into an area. *Pinus halepensis* (Fig. 23) is an endemic of the Mediterranean whose distribution closely follows the limits of that region. During the Pleistocene climatic fluctuations, *Pinus* alternated with *Quercus* in dominance (Higgs et al. 1976). *Pinus* was generally dominant in the colder periods and *Quercus* sub-dominant. This was reversed in the warmer periods. The destruction of *Quercus* forest by Man since c. 4000 B.C. is evident over the whole Mediterranean area. In Malta *Quercus ilex* forest is limited to a few venerable oaks at Wardija and a few outlying trees and scrubby oaks at Wied Hażrun. *Pinus halepensis* is widely planted as it is over the rest of the Mediterranean area and naturalises extensively in the Buskett Valley and elsewhere. Distribution of acorns requires a woodland fauna whereas distribution of pines is brought about by wind and fauna. *Pinus halepensis* therefore acts as a coloniser and *Quercus* species arrive when there is a woodland fauna and parent trees in the vicinity. If the parent trees are not present *Pinus halepensis* remains the dominant tree.

In tropical climates the temperature varies very little during the year and the dry period coincides with the period of shortest daylight, whereas in the Mediterranean climate the dry season coincides with the period of longest daylight. However, on the Mediterranean coasts the temperate rarely falls below 0°C so that there are several relics from the subtropical vegetation of the Tertiary. These include *Ceratonia siliqua*, a feature of the Mediterranean landscape, and *Cercis siliquastrum*, whose wood was found in the fires of prehistoric peoples in Malta. The oldest fossils of this species are from the Lower Eocene in N. America, and later deposits are found throughout the Tertiary. *Ficus carica* and *Myrtus communis* and the famous Maltese Fungus, *Cynomorium coccineum* (Fig. 23), are also subtropical relict species showing a disjoint distribution.

During the glacial periods of the Pleistocene, conditions were much colder than at present. Eurosiberian relict species found in Malta are few and include *Populus alba*, *Salix* spp., *Crataegus monogyna* and a Malta rarity, *Brachypodium sylvaticum*. These species are found in wet valleys and humid places where they are protected from the summer drought.

Of those species occurring in the Maltese Islands 66% are Mediterranean. Some of these have a restricted distribution on islands and dry coasts which fall into the Thermomediterranean (accentuated) subdivision of the Mediterranean climate with a dry season up to six months long. The Maltese Islands fall into this subdivision. Species of limited distribution that are common in the Maltese Islands include *Hypericum aegypticum*, *Sedum caeruleum*, *Micromeria microphylla*, *Anthyllis hermanniae*, *Centaurea nicaensis* and *Jasione glutinosa*. Rare Maltese species include *Tetractylis articulata* (formerly common cf. Abela 1647) now found in N. Africa, Malta, and one site in Spain; *Euphorbia biconvexa* found in western N. Africa, Malta and Sicily; and *Trigonella maritima* found in N. Africa, Malta, Italy and Syria. Some of these are North African species of limited European distribution. They represent 13% of the Mediterranean element in the Maltese flora. The remaining 44% is made up of cosmopolitan species such as *Phragmites australis* and weeds of waste and cultivated places. This element of the flora changes according to agricultural practices and to availability of species. One of the most recently introduced species is *Aster squamatus*, now frequent along roadsides.

There seems to be only one endemic in the Maltese Islands, demonstrating the relatively recent isolation from the mainland. This is *Centaurea crassifolia* in the Compositae. *Crepis pusilla*, originally described as *Melitella pusilla*, and thought to be an endemic genus in the Islands has recently been shown to

belong to the genus *Crepis* and to occur also in Kriti and Australia (Merxmüller. Mitt. Bot. München 7; 271-5 (1968)).

Although one can compare and contrast a Mediterranean flora by species present or absent, the plant communities are more difficult to compare owing to a varying use of terminology and language. Turrill's *Plant Life of the Balkan Peninsula* provides a background for the classification of Mediterranean plant communities. In the Maltese Islands the species found in areas of coralline plateau and valleys approximate most closely to Turrill's phrygana. Turrill emphasises that phrygana is usually a degenerate condition often produced by overgrazing of macchie which contains more shrubby and tree species. This is certainly true of Malta, place names indicate that macchie was previously found in many areas: Ballut — *Quercus ilex*, Znuber — *Pinus halepensis* and Gharghar — *Tetractylis articulata* (not found in the East Mediterranean). Other characteristic macchie taxa that are present in Malta include *Cistus*, *Smilax*, *Pistacia*, *Ceratonia*, *Spartum* and *Myrtus*. Some of these are now very rare, but if grazing were controlled in some areas, it is possible that true macchie could regenerate again at Buskett, Wied Hażrun and il-Ballut. Typical phrygana taxa include *Thymus*, *Anthyllis* and *Satureja* all of which are frequent on the Coralline plateaus of the Maltese Islands.

FRUIT TREE GROWING IN MALTA AND GOZO

by

Joe Borg

The growing of citrus and stone fruits, apples and pears was begun on a large scale only after World War I, when mainly Sicilian, Italian and French varieties were introduced. Most trees are grown as open centre, dwarf or semi-dwarf while cordon, espalier and fan types are not common. The dwarf habit types are more easily sheltered from the wind and easier to manage in the small terraced fields. The plum, Loquat or Japanese Medlar, Olive, Pomegranate, Fig and Prickly Pear are semi-vigorous to vigorous. Most of the fruits, like the vegetables are marketed through a licenced middleman (Pitkal), with the exception of Grapes for pressing which are normally grown by contract to wine merchants.

There are many varieties of fruit which have not been studied; the following list only includes the common ones.

Citrus trees

The common species are:— Lemon, *Lumija* (*Citrus limoni*); Orange, *Larinja* (*Citrus sinensis*); and Tangerine or Mandarin Orange, *Mandolina* (*Citrus deliciosa*).

Although most citrus cuttings root well, the yield is not as uniform as that given by trees budded on the Seville or Bitter Orange, *Larinja helwa* (*Citrus aurantium*). This stock also reduces gummosis. The two main requirements for citrus trees are sufficient water supply and shelter from the wind. Hence citrus trees grow well at the spring line between the Coralline and the clay (see pp. xxxv-xxxvii), and other orchards are found in sheltered areas by cliffs or rubble walls or in the valleys as at Buskett as well as in the centre of the island. Iron deficiency, which shows quickly in citrus trees, is corrected by applications of sequestrane.

By shading citrus seedlings plants are obtained with longer internodes to facilitate budding. Shading is achieved by placing 'curtains' of palm leaves (*Phoenix* sp.) or canes (*Arundo donax*) just above the seedlings.

Fig. 24. Propagation of Fruit Trees

	Common Method of Propagation	Month	Remarks
Citrus	All varieties are budded on seedlings of <i>Citrus aurantium</i>	May, early June and September	<i>C. aurantium</i> seed sown in beds in March and April, lifted and transplanted in May if water is available, or in September if water supply is limited to be budded the following year.
Bitter Almond	Traditional:—seed	a) sown fresh in September and October to germinate in January and February. b) sowing kernel only in November and December and germinate in January and February. Stratification in late November and early December.	More economical because between September and December the land could be used for a catch crop e.g. lettuce. Kernels sunk in trays with a mixture of 3 parts sand to one of peat. Germination within 20 days and pricked off at the 2 leaf stage.
Peaches and Plums	i) Budding ii) Grafting	i) May, early June and September ii) December to January	crown veener graft for adult stock.
Japanese Medlar	i) Budding	i) May early June and September	stock used is <i>Pyrus communis</i> or Quince or Sargel (<i>Cydonia oblonga</i>)
Apple	ii) Grafting i) Budding ii) Grafting	ii) December to January December to January December to January	<i>Malus sylvestris</i> stock gives uniform cropping, better pest and disease control and controlled tree shape and fruiting.
Pear	i) Budding ii) Grafting	December to January	<i>Pyrus communis</i> and <i>Cydonia oblonga</i> as stock. Stock seedlings are preferred to cuttings for ease of budding.

Propagation of Fruit Trees

	Common Method of Propagation	Month	Remarks
Pomegranate	Hardwood cuttings	November to January	Easily rooted in beds in the open.
Fig	Softwood cuttings	March to September	
Prickly Pear	Cladode cuttings	July and August	Cladodes are separated and planted out after leaving them to dry for a few days. This drying prevents rotting.
Olive	Basal root cuttings	November to January	Basal root cuttings are taken from adult trees which have to be destroyed.
	Grafting	November to January	
	Hardwood cuttings	November to January	
Carob	Softwood cuttings	March to September	
	Airlayering	March to September	
	Budding	May and June	
	Seed	March	The beans are fed to horses and donkeys which eat all but the seed which is left in the manger.
Vine	Grafting	December to February	American vine rootlings as stock.
Mulberry	Hardwood cuttings	November to January	Inserted in beds in the open and lifted the following winter.

Watering is mostly done by surface irrigation, channelling water to the trees which is very wasteful for water and soil. All citrus trees are transplanted with a ball of earth during May.

The most popular varieties of oranges which between them give a continuous supply of fruit between December and June, are the Malta Blood Orange, *Larinsa tad-demm*; the Bahia Orange, *Larinsa bahrija*; the Sweet Orange, *Larinsa helwa*; both varieties of *Citrus aurantium* and the Mandarene, *Mandolina* (*Citrus deliciosa*).

The Lemon is grown for its culinary and medicinal values, the popular variety the perpetual or ever-flowering lemon, *Lumija ta' kull stagun*, yields more than one crop per year.

Stone fruit trees

The common species are Peach, *Hawha* (*Prunus persica*), Plum, *Ghajnbagna* or *Pruna* (*Prunus domestica*) and Apricot, *Berquqa* (*Prunus armeniaca*).

The Bitter Almond, *Lewza morra* (*Prunus dulcis*) has proved to be the best stock for Peaches and some varieties of plums. Apricot varieties are worked on *Prunus armeniaca* or on the Bitter Almond, but using the Cherry plum as an intermediary. The almond is more resistant to pests, diseases and drought, and is abundant. The two traditional methods of sowing the almonds are wasteful of time and of land because they take a long time to germinate. During 1967-68 trials of stratification of the almonds for the production of seedlings were carried out. The main advantages would be that the seedlings would occupy the land for a shorter overall period, and there would be no gaps in the field due to failure in germination. As part of an F.A.O. sponsored Horticultural Development programme started in 1965, the Department of Agriculture initiated trials of newly imported varieties of fruit trees. The varieties were chosen to avoid a glut of fruit in the market at any time. The trials took into account the suitability of both variety and stock for a warm climate, alkaline soil, low altitude and drought resistance.

Other fruit trees

The Japanese Medlar or Loquat, *Naspla* (*Eriobotrya japonica*) is often planted. During 1967 a number of East Malling and Malling-Merton rootstock varieties of the Crab Apple, *Tuffieha* (*Malus sylvestris*) were introduced by the Department of Agriculture for trials, but the bulk of the stock has come from Sicilian and Italian nurseries. Since 1965 many promising varieties from the continent and from the University of California, U.S.A. have been undergoing trials. Cooking varieties are not much in demand.

The Cultivated Pear, *Langas* (*Pyrus communis*) is found mainly on the heavy clay soils. Pear varieties, like the apples, fall into five categories.

- The early ones which fruit in June and July e.g. the Malta June Pear, *Maskarella ta' Malta*.
- The mid-early varieties fruiting in August and September e.g. *Coscia* — an Italian variety which has led to many other varieties since 1960.
- The mid-late varieties fruiting in October and November e.g. *Conference*.
- The late varieties which fruit in December and January e.g. *Triomphe de Touraine*.
- The very late varieties which fruit from January to March e.g. *Bergamotte espiere*.

The small Malta June Pear, *Bambinella* is a local popular small fruited variety. In contrast to the British, the Maltese market prefers smaller varieties. The British National fruit tree trial grounds at Faversham, Kent, have now obtained budwood of this variety for trials, which might be useful for canning.

The Pomegranate, *Rummien* (*Punica granatum*) is less popular than it was

ten years ago. It is drought resistant and thrives in poor soils. Its fruit is ripe in October.

The Fig, *Sigra tat-tin* (*Ficus carica*) is an endemic tree to the Mediterranean countries. Caprification, which is essential for some varieties, is the process of transferring the pollen grains from the male caprifig, *Ficus carica*, *Caprificus* or *Bakkar*, to the ovary of the female tree by the insect *Blastophaga grossorum* (order Hymenoptera). There are various local and foreign varieties, the most popular being The Parsott which is reputed to have been introduced to the Islands by the Grandmaster Jean Parisot de la Valette (the bulder of the present Capital City); the St. John's Fig, *Tina ta' San Gwann* and the common White Fig, *Tina bajda*.

Apart from being eaten fresh, the fruits of some varieties are dried, flavoured in *liqueur* (such as rum) and preserved for eating as a dessert during winter.

The Prickly Pear, *Bajtar tax-xewk* (*Opuntia ficus-indica*) is frequently cultivated and often naturalised. Nowadays only the first crop of fruits appearing in July is used for human consumption, the later ones being fed to farm animals. The cladodes (or modified stems known as *Pal tal-Bajtar*) are also used as fodder for farm animals during summer when vegetation is scarce. Since it is a fast growing tree and the cladodes are adapted to water storage, it grows in practically all dry soils and even in small pockets of earth among rocks. It is also used for shelterbelts around dry farmed land (*Raba tal-Baghli*).

The Olive, *Zebbug* (*Olea europaea*) played an important part in the Islands' economy for many years for the production of oil.

In the 1950s the government was financially aided by the British to plant more trees, mainly Olives and Carobs. They were planted in pits blasted in the rocks mostly at Mellieha, St. Paul's Bay, Ghajn Tuffieha, Tal-Ballut, Miziep and Zebbar.

After 1965 the Agricultural Department initiated a drive to crown-graft privately owned adult Olives trees to table varieties, as they are rarely pressed for oil today.

The fruit of the Carob, *Harruba* (*Ceratonia siliqua*) is nowadays only used as fodder. The fruit is traditionally harvested by August 18th. This tree has a very formidable root system, it is drought resistant and soon becomes naturalised in rocky barren land.

The Grape or Vine, *Dielja* (*Vitis vinifera*) is very common, being suitable to the Island because of its drought resistance, its excellent fruit and for wine making. Since 1965 the Government Viticulture section has been increasing the population of vines. American Vine rootlings (*Bar batelle*) are imported and sold each year at subsidised prices. The advice offered by the Ministry to plant vines along rubble walls of dry fields is being followed. This enables farmers to get a crop in the dry summer months. There are many local and foreign varieties under cultivation for both wine making and the table.

The Black Mulberry, *Tuta* (*Morus nigra*) is not often planted now probably because of its persistent staining fruit. It is wind and drought resistant and fruits from May till early August although by then the quality of the fruit declines. The White Mulberry, *Cawsla* (*Morus alba*) is associated with farmsteads and frequently planted along roads particularly in Gozo.

MEDICINAL PLANTS IN MALTA

by

H. Micallef

(Before his death Professor H. Micallef promised an article on medicinal plants for the Malta Flora, but was unable to complete it. By permission of his widow, and of the Malta Union of Pharmacists, we have included an extract (in a few cases slightly reworded) from his paper in the *Journal of the Malta Union of Pharmacists* 11(1): 20-23 (1970). The latin names of the plants have been brought up to date).

Since early times, during his tireless quest for food, Man has found either by accident or methods of trial and error that certain wild plants help him to alleviate some of his sufferings from disease and injury. This is not a history of local medicine since its origin, though several known drugs must surely have been introduced by the succession of settlers who occupied Malta through the ages. I shall limit myself to mentioning a number of plants reputed to have medicinal virtues. Among them are included indigenous or imported and naturalised plants which either grow wild as weeds or have been grown or cultivated in Maltese gardens, sometimes for centuries. Some have been exhaustively studied and are thoroughly known, while others have been largely ignored, although they have retained their popularity at least with a small rural section of the community.

Before the introduction of milk-pasteurization there were many cases of Mediterranean or Undulant Fever in Malta. Boiled, sliced *Citrus limon* and *Pollenis spinosa* were popular remedies, while *Centaureum erythraea* and *Blackstonia perfoliata* were other favourites. Diabetes is another disease affecting a high percentage and *Trigonella foenum-graecum* was resorted to in the past. Among those plants known to have an action like *Digitalis* and *Strophanthus* are the cardiac tonics *Urginea maritima* (also used to kill rats), *Adonis annua*, *Smilax aspera* and *Nerium oleander*.

Ricinus communis and *Ecballium elaterium* are very well known as purgatives. *Aloe vera*, *Rhamnus alaternus*, *Melia azedarach* and *Phytolacca americana* (an adulterant of *Digitalis*) also have purgative action, while the berries of *Sambucus nigra* and the seeds of *Plantago afra* are laxatives. *Tamarix gallica*, *Tamus communis*, *Iris germanica* and *Iris pallida* are other laxatives, while two or three drops of *Euphorbia chamaecyze* fluid produces a drastic action if applied to the skin. *Saxifraga tridactylites* is a cholagogue, while *Taraxacum officinale* is used for affections of the liver.

Plants known to produce a diuretic action include *Borago officinalis*, *Urginea maritima*, *Allium cepa*, *Parietaria officinalis*, *Scirpus lacustris*, *Cyperus longus*, *Herniaria glabra*, *Iris germanica*, *Iris pallida*, *Dipsacus fullonum*, *Minuartia hybrida*, *Antirrhinum majus*, *Reseda alba*, *Reseda lutea*, *Juncus subuliflorus*, *Asparagus officinalis*, *Lonicera caprifolium*, *Tamus communis*, *Arundo donax*, *Cynodon dactylon* and *Spartium junceum*, the last mentioned containing sparteine, a powerful diuretic.

Many others have astrigent properties. These include the bark of *Salix alba*, *Cynomorium coccineum* (used for diarrhoea and dysentery), *Epilobium* roots and *Verbena officinalis* (used as a decoction to relieve bleeding piles). The petals of *Rosa gallica* and the leaves of *Sambucus nigra*, *Sambucus ebulus*, *Symphytum officinale*, *Scirpus lacustris*, *Cydonia oblonga*, *Plantago major*, *Achillaea* sp. *Scrophularia auriculata*, *Geranium robertianum* and *Geranium rotundifolium* are also astrigent. Of these, *Scrophularia auriculata* and the leaves of *Sambucus nigra* and *Sambucus ebulus* have a vulnerary as well as astrigent action. Flowers of

Hypericum are vulnerary and are used in an olive-oil infusion in eczema sores, while *Plantago major* is also used to cover sores. *Achillaea* and *Herniaria glabra* are also vulnerary. *Typha latifolia* inflorescence provides a good haemostatic remedy for wounds.

The bulb of *Gladiolus italicum* and stigmas of *Mentha pulegium* are emmenagogues. *Gladiolus italicum* also has an aphrodisiac action, while *Vitex agnus-castus* is anaphrodisiac. *Chamomilla recutita*, *Citrus aurantium*, *Citrus deliciosa*, *Citrus limetta*, *Salvia officinalis*, *Salvia triloba*, *Scrophularia auriculata*, *Cyperus longus*, *Geranium robertianum* and *Geranium rotundifolium* have tonic properties. Excitant and diaphoretic properties are found in *Erodium moschatum* and *Dipsacus fullonum*.

Orange-flower water obtained from *Citrus bergamia*, and *Salvia officinalis*, *Salvia triloba*, *Fumaria officinalis*, *Fumaria capreolata*, *Chamomilla recutita*, *Mentha piperita*, *Mentha pulegium* and *Melissa officinalis* are important stomachics. The last three, together with *Pimpinella anisum* and *Cuminum cyminum* are good carminatives. *Fumaria officinalis* and *Fumaria capreolata* are useful depuratives as well as stomachics. Depurative for skin diseases is found in *Scabiosa atropurpurea*, while *Viola tricolor* as an infusion, is reputed to be effective in skin eruptions.

Externally the seeds of *Trigonella foenum-graecum* can be used to act as an emollient. *Arundo donax*, *Cynodon dactylon*, *Acanthus mollis* and infused seeds of *Plantago afra* are also good emollients. So are the sweet drupes of *Zizyphus jujuba*, while the leaves of *Umbilicus horizontalis* are emollient for hard testes.

The drupes of *Zizyphus jujuba* are also a good medicine for chest complaints. Poultices of *Parietaria officinalis* are reputed to be effective in bronchial catarrh. In chronic catarrh and asthma *Aristolochia longa* is employed. *Salvia verbenaca* is taken as an infusion for coughs, while in coughs and jaundice *Ballota nigra* and *Marrubium vulgare* are effective. *Urginea maritima* is an expectorant, and *Chamomilla recutita* has an antispasmodic action.

Datura metel, *Hyoscyamus albus*, *Papaver somniferum* and *Papaver rhoeas* have a sedative action. The flowers of *Sambucus nigra* and *Sambucus ebulus* are sudorific, while *Allium sativum* is a febrifuge.

There are several other plants used as remedies for other ailments. Thus *Allium sativum* has a rubefacient action, *Chelidonium majus* is a rubefacient which also destroys corns and warts, while the powdered seeds of *Brassica nigra* are rubefacient and vesicant. *Cucurbita maxima* and *Punica granatum* are used to expel tapeworms, while *Artemisia absinthium* and *Melia azedarach* have an anthelmintic action. Certain plants are used in cases of gravel, like *Equisetum ramosissimum*, *Minuartia hybrida*, *Micromeria microphylla*, and *Ajuga reptans*. *Citrus limon* and *Citrus limetta* have antiuric properties. The orange-flower water already mentioned and *Veronica beccabunga* are antiscorbutic. *Iris foetidissima* is used in scrofula. Gouty affections are relieved by a poultice made from *Capparis spinosa*, while *Ruta chalepensis* is used for bruises and to relieve sprains and contusions. In weaning off *Aloe vera* is used.

There are certain plants which also yield oils or substances extracted from them that are used in medicine. Thus, *Olea europaea* drupes are used for the valuable olive oil. *Rosmarinus officinalis* is the source of rosemary used for perfume. *Mentha piperita* has an oil rich in menthol, and other oil-containing plants like *Coriandrum sativum*, *Foeniculum vulgare* and *Anthriscus cerefolium* are used as condiments.

CONSERVATION OF THE FLORA

Conservation of the Flora of the Maltese Islands is possibly more difficult than anywhere else in Europe. With the second highest population density in the world, and a long history of agriculture over most of its surface, little natural or semi-natural vegetation is left and most of that is on the inaccessible coastal cliffs.

During the spring and to a much lesser extent in the autumn and winter the cultivated fields are covered by a mass of colourful weeds, including bulb plants such as *Gladiolus* and *Narcissus*. The people of rural areas have long picked bunches of these flowers for sale and for house decoration, but while the weeds are so abundant they will make little impression on their numbers.

The most serious threats to the Flora of the Islands arise from development for tourism, the spread of building, the reclamation of waste land and the increased use of herbicides. The building of hotels in the more remote areas as at Ghadira (Fig. 12), results in trampling and disturbance of the surrounding areas. The readily accessible parts of the coastline are already much affected by trampling. At present few herbicides are used, but should they be introduced to a greater extent the restricted flowering periods of many of the weedy species would make them very vulnerable. As both the tourist industry and agriculture are important parts of the Maltese economy, the areas which can be left in their natural state are necessarily limited. But protected reserves would also be increasingly attractive to tourists, and a planned tourist development could include protected areas where natural beauty and interest can be enjoyed. Among the most important areas needing protection are the Wardija Ridge, the pool and sand dunes at Ghadira and in Gozo, the dunes at Ramla bay and the coralline plateau and valley between Ta' Cene and Mgarr ix-Xini. These together with the Wiedes contain much of what is left of the semi-natural vegetation of the Islands.

Most of the land is private, although not necessarily fenced or walled. This applies to waste and cultivated land. During migration seasons large scale shooting is carried out from such land, entry into which can therefore present a significant hazard to the botanist.

EXPLANATION OF TEXT

The arrangement of families follows that of Tutin et al in *Flora Europaea* (1964 -) which is based on that of H. Melchior in A. Engler, *Syllabus der Pflanzenfamilien* ed. 12 (1954-64). Latin names in most cases follow those in *Flora Europaea* as far as they are available. Synonyms are given where it is necessary to connect the modern names with those in John Borg's *Descriptive Flora of the Maltese Islands* (1927). English names are given for every species. For those species occurring in the British Isles the names selected by a special committee of the Botanical Society of the British Isles (Dony et al. (1974)) have been followed. For the remainder new names have mostly had to be created. Maltese names have been given for as many species as possible.

Descriptions follow those of *Flora Europaea* as far as it is available, though certain terms (i.e. pendulous for pendent) have been altered and in some cases descriptions have been rewritten to fit better the Maltese plants. Keys are mostly specially written though they are in many cases based on those in *Flora Europaea*.

As regards selection of species included in the *Flora* we have been liberal rather than conservative. Many are included on very slender evidence, but as it is

possible they occur we have included descriptions so that they can be searched for and recognised if found. As cultivated plants form a very important part of the Maltese landscape we have included as many as possible.

An account of infraspecific variation has been given under some species, but geographical and ecological variation in species of the central Mediterranean region is not well understood, especially in connection with the remainder of the European and North African flora.

As regards distribution we have tried to include all those localities given by Gulla, Duthie, J.C.G. Delicata (G.D.), Sommer and Caruana Gatto (S. & C.G., 1915) and Borg (1927), with additional information particularly by G. Lanfranco and Kramer and Westra. The present distribution of many of the species is not accurately known, but we have added our own information where possible. This is usually inserted on the authority of P.A.W. who covered the most ground and is best able to make general statements. The ecological statements are based on published notes plus the fieldwork carried out by S.M.H. and P.A.W.

The general distribution of the plants outside the Maltese Islands is given, but is in no way meant to be precise, only to give an idea of the species as a whole.

KEY TO THE FAMILIES

- | | | | | |
|--|--|---|---|--|
| <p>1. Plant reproducing by spores; no flowers; plant always herbaceous
Plant reproducing by seeds; flowers usually present; woody or herbaceous</p> <p>2. Stems jointed; leaves flowering a sheath at the nodes
Stems not jointed; leaves not fused into a sheath</p> <p>3. Leaves not differentiated into lamina and petiole
Leaves with distinct lamina and petiole</p> <p>4. Leaves borne on a creeping stem
Leaves forming a basal rosette</p> <p>5. Fertile and sterile leaves dissimilar
Fertile and sterile leaves similar (or differing only in size)</p> <p>6. Sori not covered by deflexed margin of leaf
Sori covered by deflexed margin of leaf</p> <p>7. Rhizome short, superficial
Rhizome long, subterranean</p> <p>8. Ovules not enclosed in an ovary, borne either on the upper surface of scales arranged in cones, or solitary and terminal on lateral stems; perianth absent; trees or shrubs
Ovules completely enclosed in an ovary; perianth (sepals or petals or both) present; herbs, trees or shrubs</p> <p>9. Leaves all scale-like and usually brownish; internodes long
Most leaves green; internodes short</p> <p>10. Trees with whorled branches
Trees with branches not in whorls</p> <p>11. Leaves 2-5 on short shoots
Leaves opposite or whorled</p> <p>12. Plant free-floating on or below the surface of the water, not rooted in mud, very small
Land plants or aquatics rooted in mud</p> | <p>(Pteridophyta)</p> <p>III. Equisetaceae</p> <p>I. Selaginellaceae
II. Isoetaceae</p> <p>V. Gymnogrammeaceae</p> <p>VII. Asplenaceae</p> <p>IV. Adiantaceae
VI. Hypolepidaceae</p> <p>(Gymnospermae)</p> <p>(Angiospermae)</p> <p>XI. Ephedraceae</p> <p>X. Araucariaceae</p> <p>VIII. Pinaceae
IX. Cupressaceae</p> <p>CVIII. Larnaceae</p> | <p>2.</p> <p>8.</p> <p>3.</p> <p>4.</p> <p>5.</p> <p>6.</p> <p>7.</p> <p>9.</p> <p>12.</p> <p>10.</p> <p>11.</p> <p>13.</p> | <p>13. Perianth of 2 (rarely more) whorls differing markedly from each other in shape, size or colour
Perianth not of 2 or more markedly different whorls</p> <p>14. Petals not all united into a tube at base, very rarely cohering at apex
Petals all united at base into a longer or shorter tube</p> <p>15. Ovary superior
Ovary inferior or partly so</p> <p>16. Carpels 2 or more, free, or united at the base only
Carpels obviously united for $\frac{1}{2}$ their length or more, or carpel solitary</p> <p>17. Sepals 3; petals 3
Sepals or petals more than 3</p> <p>18. Carpels more than 3
Carpels 3</p> <p>19. Leaves simple, sessile; moss-like plant
Leaves palmately divided; petioles spiny; plants over 1 m. tall.</p> <p>20. Stamens numerous
Stamens not more than twice as many as petals</p> <p>21. Herbs; stipules 0, though leaf-bases sometimes sheathing; flowers hypogynous
Shrubs or herbs with stipulate leaves; flowers perigynous</p> <p>22. Carpels spirally arranged on an elongated receptacle; leaves not succulent
Carpels in 1 whorl; leaves more or less succulent</p> <p>23. Flowers actinomorphic
Flowers zygomorphic</p> <p>24. Stamens more than twice as many as perianth segments
Stamens not more than twice as many as perianth segments</p> <p>25. Stamens with their filaments united into a tube
Stamens free or united in bundles</p> | <p>14.</p> <p>108.</p> <p>15.</p> <p>75.</p> <p>16.</p> <p>64.</p> <p>17.</p> <p>23.</p> <p>18.</p> <p>20.</p> <p>19.</p> <p>XXIV. Alismataceae</p> <p>XXXIV. Crassulaceae</p> <p>CVI. Palmae</p> <p>21.</p> <p>22.</p> <p>XXVIII. Ranunculaceae</p> <p>XXXVI. Rosaceae</p> <p>XXVIII. Ranunculaceae</p> <p>XXXIV. Crassulaceae</p> <p>24.</p> <p>52.</p> <p>25.</p> <p>29.</p> <p>26.</p> |
|--|--|---|---|--|

26. Ovary surrounded by a cup-shaped perigynous zone; ovule 1
Ovary without cup-shaped perigynous zone; ovules 2 or more
27. Styles more than 1, free
Style 1 or 0
28. Petals 4
Petals 5
29. Trees, shrubs or woody climbers
Herbs, sometimes more or less woody at base
30. Fruit a berry or a dry drupe
Fruit a dehiscent capsule
31. Leaves pinnate
Leaves simple (or palmately lobed)
32. Tree up to 20 m. high; freely suckering
Shrub or small tree up to 8 m. high; not suckering
33. Leaves simple; coriaceous
Leaves palmatisect
34. Petals cohering at the apex; corolla without a corona
Petals spreading; corolla with a corona
35. Leaves pinnate
Leaves simple, ericoid
36. Sepals 2; petals 5
Sepals as many as petals
37. Flowers strongly perigynous with a long tubular or campanulate receptacle
Flowers hypogynous, or perigynous with a flat or weakly concave receptacle
38. Cauline leaves opposite or whorled
Leaves alternate or all basal
39. Leaves deeply divided or pinnate, rarely only serrate
Leaves simple and entire
40. Petals 4
Petals 5
41. Stamens without scales on inner side of the filaments
Stamens with scales on the inner side of the filaments

XXXVI. Rosaceae

LII. Hypericaceae

XXX. Papaveraceae

LV. Cistaceae

XLV. Simaroubaceae

XLVIII. Anacardiaceae

XLIX. Rhamaceae

L. Vitaceae

LIV. Passifloraceae

XLVI. Meliaceae

LVI. Tamaricaceae

XXVI. Portulacaceae

LXI. Lythraeae

XXXII. Cruciferae

XXXIX. Geraniaceae

XLI. Zygophyllaceae

42. Stipules present
Stipules absent

43. Stipules scarious; land-plants
Stipules not scarious; usually submerged aquatic

44. Styles connate; placentation parietal
Styles free; placentation free central

45. Leaves ternate
Leaves not ternate

46. Sepals and petals 2-3
Sepals and petals 4-5

47. Sepals and petals 4; stamens 4 or 6
Sepals and petals 5; stamens 5 or 10

48. Stipules present; stamens usually 4
Stipules absent; stamens usually 6

49. Leaves with numerous pellucid glands; strongly scented when crushed
Leaves without pellucid glands

50. Stigmas 2-4
Stigmas 5

51. Leaves lobed or pinnate
Leaves entire

52. Flowers saccate or spurred at base
Flowers not as above

53. Sepals 2, small
Sepals 5; petals 5

54. Leaves opposite
Leaves alternate

55. Stamens 8, not as below
Stamens 5, introrse round the ovary

56. Filaments united into a tube
Stamens free

57. Anthers opening by slits
Anthers opening by pores

58. Trees or shrubs
Herbs

59. Leaves simple; ovary on a long gynophore
Leaves compound; ovary sessile

60. Petals fimbriate or lobed
Petals entire or emarginate

XXVII. Caryophyllaceae

LVIII. Elatinaceae

LVII. Frankeniaceae

XXVII. Caryophyllaceae

XXXVIII. Oxalidaceae

XX. Polygonaceae

XXXII. Cruciferae

XXVII. Caryophyllaceae

XLIV. Rutaceae

XXVII. Caryophyllaceae

XXXIX. Geraniaceae

XLII. Linaceae

XXX. Papaveraceae

XXXIX. Geraniaceae

XL. Tropaeolaceae

LIII. Violaceae

XXXVII. Leguminosae

XLVII. Polygalaceae

XXXI. Capparaceae

XXXVII. Leguminosae

XXXVI. Resedaceae

61. Stamens 10
Stamens not more than 6
62. Leaves trifoliate or pinnate
Leaves simple, palmately veined
63. Sepals inserted on a cup-like perigynous zone
Sepals free; ovary 2-locular
64. Petals numerous
Petals 5 or fewer
65. Petals and sepals 3
Petals and sepals 2, 4 or 5
66. Stigmas and stamens sessile
Style and filaments obvious
67. Stamens 6
Stamens 3
68. Stamens numerous
Stamens 10 or fewer
69. Leaves opposite, with pellucid glands
Leaves alternate, without pellucid glands
70. Styles free; fruit fleshy
Styles united; seeds covered with pulp
71. Aquatic; leaves pinnate; segments filiform; flowers in spikes
Not as above
72. Woody climbers
Herbs
73. Petals 4
Petals 5
74. Stamens 10
Stamens 5
75. Ovary superior
Ovary inferior
76. Stamens at least twice as many as corolla-lobes
Stamens as many as or fewer than corolla lobes
77. Herbs with succulent leaves
Shrubs with coriaceous leaves
78. Plant without chlorophyll; leaves scale-like
Green plants

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|---------|-----------------|
| XXXVII. | Leguminosae |
| XXXIX. | Geraniaceae |
| XXVII. | Caryophyllaceae |
| XXXII. | Cruciferae |
| XXV. | Aizoaceae |
| CV. | Orchidaceae |
| CI. | Amaryllidaceae |
| CIH. | Iridaceae |
| LXII. | Myrtaceae |
| XXXVI. | Rosaceae |
| LXIII. | Punicaceae |
| LXV. | Halonagaceae |
| LXVII. | Araliaceae |
| LXIV. | Onagraceae |
| XXXV. | Saxifragaceae |
| LXVIII. | Umbelliferae |
| XXXIV. | Crassulaceae |
| LXIX. | Ericaceae |

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|--|-----------|------------------|-----|
| 79. Flowers actinomorphic; stem slender, twining | LXXVII. | Convolvulaceae | |
| Flowers zygomorphic; stem stout, erect | LXXXVI. | Orobanchaceae | |
| 80. Ovary deeply 4-lobed with 1 ovule in each lobe | | | 81. |
| Ovary not 4-lobed | | | 82. |
| 81. Leaves alternate | LXXIX. | Boraginaceae | |
| Leaves opposite | LXXXII. | Labiatae | |
| 82. Flowers actinomorphic or nearly so | | | 83. |
| Flowers strongly zygomorphic | | | 96. |
| 83. Carpels free | | | 84. |
| Carpels united | | | 85. |
| 84. Corolla without a corona; styles 2, united except at base | LXXIV. | Apocynaceae | |
| Corolla with a corona; styles 2, free but united by the stigma | LXXV. | Asclepiadaceae | |
| 85. Stamens fewer than corolla-lobes | | | 86. |
| Stamens as many as corolla-lobes | | | 87. |
| 86. Shrubs or trees | LXXII. | Oleaceae | |
| Herbs | LXXXIV. | Scrophulariaceae | |
| 87. Stamens opposite the corolla-lobes | | | 88. |
| Stamens alternating with the corolla lobes | | | 89. |
| 88. Style 1; stigma 1; ovules numerous. | LXX. | Primulaceae | |
| Styles or stigmas more than 1; ovule 1 | LXXI. | Plumbaginaceae | |
| 89. Sepals, petals and stamens 4 | LXXXVIII. | Plantaginaceae | |
| Sepals, petals and stamens 5 (rarely sepals fewer) | | | 90. |
| 90. Shrubs or herbs over 2 m. high | | | 91. |
| Herbs | | | 92. |
| 91. Flowers in dense cymes; corolla limb white | LXXXVII. | Myoporaceae | |
| Flowers in scorpioid cymes; corolla limb blue | LXXXVIII. | Hydrophyllaceae | |
| 92. Leaves opposite | LXXIII. | Gentianaceae | |
| Leaves alternate or all basal | | | 93. |
| 93. Ovules 4 or fewer | | | 94. |
| Ovules numerous | | | 95. |
| 94. Flowers solitary or few, not in scorpioid cymes; corolla not or scarcely lobed | LXXVII. | Convolvulaceae | |
| Flowers numerous in scorpioid cymes; corolla-lobes distinct | LXXIX. | Boraginaceae | |

95. Corolla-tube long, or anthers connivent Corolla-tube much shorter than lobes; stamens spreading	LXXXIII. Solanaceae
96. Ovules numerous Ovules 4	LXXXIV. Scrophulariaceae
97. Bracts shorter than calyx Bracts or bracteoles much longer than calyx	LXXX. Verbenaceae
98. Leaves in whorls of 4 or more Leaves not in whorls	LXXXV. Acanthaceae
99. Leaves opposite; stipules interpetiolar Leaves alternate or stipules not inter- petiolar	LXXVI. Rubiaceae
100. Flowers in capitula surrounded by an in- volucre of more than 2 bracts Flowers not in capitula, or bracts 2	LXXVI. Rubiaceae
101. Anthers free Anthers coherent in a ring round the style	XCI. Dipsacae
102. Ovule 1; calyx if present represented by hairs or scales Ovules numerous; calyx lobes conspi- cuous; green	XCH. Compositae
103. Anthers sessile; pollen grains cohering in pollinia Stamens with filaments; pollen grains free	XCH. Campanulaceae
104. Stamens 1-3 Stamens 4-5	CV. Orchidaceae
105. Shrubs or woody climbers Herbs	XC. Valerianaceae
106. Leaves pinnate Leaves simple	LXXXIX. Caprifoliaceae
107. Flowers unisexual; fruit fleshy Flowers hermaphrodite; fruit a capsule	LXXXIX. Caprifoliaceae
108. Perianth entirely petaloid Perianth not petaloid, often absent	LIX. Cucurbitaceae
109. Parasites or saprophytes without chloro- phyll Green plants	XCH. Campanulaceae
110. Stems succulent, leaflets, but with groups of spines Not as above	XIX. Balanophoraceae
	LX. Cactaceae

111. Stamens more than 12 Stamens 12 or fewer	XXVIII. Ranunculaceae	112.
112. Flowers in ovoid capitula without an in- volucre Flowers not in capitula or if with capi- tula with an involucre	XXXVI. Rosaceae	113.
113. Ovary superior Ovary inferior, or flowers male		114.
114. Perianth segments 4 Perianth segments more than 4		115.
115. Carpels more than 1, free or nearly so Carpels 1, or carpels obviously united	XXIV. Phytolaccaceae	116.
116. Perianth segments 6 Perianth segments 5	XCIX. Liliaceae	117.
117. Stigmas 2-3; stipules sheathing, scarious stigma 1; stipules absent	XX. Polygonaceae	
118. Leaves in whorls of 4 or more Leaves not in whorls	XXIII. Nyctaginaceae	
119. Flowers in a capitulum surrounded by an involucre Flowers not in a capitulum, though sometimes shortly pedicellate in com- pact umbels	LXXIV. Rubiaceae	119.
120. Inflorescence 6-8 m. high with horizont- al branches Inflorescence not more than 1 m. high	XCH. Compositae	120.
121. Ovules numerous Ovules 1 or 2	C. Agavaceae	121.
122. Perianth tubular with a unilateral entire limb Perianth segments 6; not as above		122.
123. Stamens 6 Stamens 3		123.
124. Leaves opposite Leaves alternate	XVIII. Aristolochiaceae	124.
125. Flowers in axillary spike-like racemes Flowers in umbels or superposed whorls	CI. Amaryllidaceae	
126. Trees, shrubs or woody climbers Herbs	CH. Iridaceae	
127. Flowers on flattened evergreen cladodes Not as above	XC. Valerianaceae	125.
	XVII. Santalaceae	
	LXVIII. Umbelliferae	127.
		128.
	XCIX. Liliaceae	128.

128. Most leaves opposite or subopposite. All leaves alternate		129. Flowers in spikes	XCVI. Potamogetonaceae	143.
129. Stems green and fleshy or leaves fleshy Neither stems or leaves fleshy	XXI. Chenopodiaceae	131. Flowers not in spikes, or absent		144.
130. Flowers in catkins Flowers not in catkins	XII. Salicaceae LXXII. Oleaceae	143. Marine plants or in salt water pools Fresh- or brackish-water plants		147.
131. Leaves pinnate Leaves simple		144. Leaf-blade narrowed towards base Leaves filiform, or if flat, not narrowed towards base	XCIV. Hydrocharitaceae	145.
132. Style 1; fruit a lomentum Style 3; fruit a dry 1-seeded drupe	XXXVII. Leguminosae XLVIII. Anacardiaceae	145. Leaves all basal Leaves opposite or alternate	XCVI. Juncaginaceae	146.
133. Anthers opening by transverse valves Anthers opening by longitudinal slits	XXIX. Lauraceae	146. Carpels in fruit with stalks several times their own length Carpels more or less sessile in fruit	XCVII. Potamogetonaceae XCVIII. Zannichelliaceae	148.
134. Flowers not in catkins or dense heads Flowers in catkins or dense heads		147. Flowers axillary; sessile or shortly pedicellate Flowers in heads on long peduncles or in compound inflorescences		150.
135. Flowers hermaphrodite; no latex present Flowers unisexual; latex present	XIV. Ulmaceae XLIII. Euphorbiaceae	148. Perianth segments 6; leaves obovate Perianth segments 0-4; leaves linear to lanceolate	LXI. Lythraceae	149.
136. Latex present; fruit or false fruit fleshy Latex absent; fruit dry	XV. Moraceae	149. Leaves opposite (freshwater) Leaves alternate (brackish)	LXXXI. Callitrichaceae XCVIII. Zannichelliaceae	
137. Dioecious; perianth absent Monoecious; perianth present in male or female flowers, or both	XII. Salicaceae XIII. Fagaceae	150. Flowers hermaphrodite Flowers unisexual; inflorescence with female heads below and male heads above	CIV. Juncaceae	
138. Perianth absent or represented by scales or bristles, minute in flower; flowers in the axils of bracts, a number of which are usually closely imbricate on a rach- is, forming a spikelet; leaves usually li- near, grass-like, sheathing below Perianth present, or flowers not arrang- ed in spikelets		151. Climbing plants with unisexual flowers Not climbing, or rarely climbers with hermaphrodite flowers	CIX. Sparganiaceae CII. Dioscoraceae	152.
139. Flowers with a bract below only; sheaths usually closed; stems usually with solid internodes Flowers usually with a bract above and below, sheaths usually open; stems usually with hollow internodes	CXI. Cyperaceae CXII. Gramineae	152. Leaves linear Leaves lanceolate or wider, or some- times small and scale-like, but never simple and linear		153.
140. Aquatic plants; leaves submerged or floating; inflorescence sometimes emer- gent Terrestrial plants, or if aquatic, with in- florescence and either stems or leaves emergent		153. Flowers unisexual Flowers hermaphrodite		154.
141. Leaves divided into numerous filiform segments Leaves entire or dentate or filiform	LXV. Haloragaceae	154. Female flowers solitary; male flowers solitary or in short cymes Male and female flowers numerous in dense heads or spikes	XXI. Chenopodiaceae	155.
		155. Male and female flowers in separate globose heads Flowers in a dense cylindrical spike, male above, female below	CIX. Sparganiaceae CX. Typhaceae	157.
		156. Carpel 1 Carpels more than 1		158.

157. Leaves not subverticillate, exstipulate
Leaves subverticillate, with minute stipules
XXI. Chenopodiaceae
158. Flowers in unbranched racemes; styles short or 0
Flowers in cymes in a branched inflorescence; styles 3; distinct
XXVII. Caryophyllaceae
159. Leaves compound
Leaves simple or apparently absent
XCVI. Juncaginaceae
160. Flowers not in compound umbels
Flowers in compound umbels
CIV. Juncaceae
161. Flowers numerous, small, crowded on an axis (spadix), subtended and more or less enclosed by a conspicuous bract (spathe)
Not as above
XXXVI. Rosaceae
LXVIII. Umbelliferae
162. Leaves apparently absent; stem green and succulent
Leaves obvious; stem not succulent
CVII. Araceae
163. Lower leaves opposite, upper alternate; monoecious; male flowers with 2-partite perianth, female with tubular perianth
Not as above
XXI. Chenopodiaceae
164. Plant densely clothed with stellate hairs; ovary 3-locular with 1 ovule in each loculus
Not as above
LXVI. Theligonaceae
165. Leaves alternate or all basal (rarely the lower opposite)
Leaves opposite (rarely a few upper apparently alternate)
XLIII. Euphorbiaceae
166. Carpels attached to a central axis, otherwise free
Carpels united or one only
XXIV. Phytolaccaceae
167. Stamens 12
Stamens 10 or fewer
XVIII. Aristolochiaceae
168. Stipules united into a sheath
Stipules free or absent
XX. Polygonaceae
169. Ovary superior
Ovary inferior
XVII. Santalaceae
170. Perianth tubular below
Perianth-segments free, or nearly so, rarely absent in female flowers
XXI. Chenopodiaceae

171. Perianth segments 4
Perianth-segments 5
XVI. Urticaceae 172.
172. Perianth herbaceous, rarely absent in female flowers
Perianth scarious
XXI. Chenopodiaceae
XXII. Amaranthaceae 174.
173. Leaves toothed or lobed
Leaves entire
XLIII. Euphorbiaceae
XVI. Urticaceae
LXXXI. Callitrichaceae 175.
174. Perianth segments 3; styles 2
Perianth segments 4 or 2; style 1
175. Perianth 0; ovary compressed, 4-lobed
Perianth present; ovary not as above
XXI. Chenopodiaceae 176.
176. Leaves with a long spinose apex; fruit transversely winged
Leaves without a long spinose apex; fruit unwinged
XXVII. Caryophyllaceae
177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191.

PTERIDOPHYTA

Plants with an alternation of free-living generations. Sporophytes with vascular tissue, usually perennial and herbaceous, reproducing by spores which give rise to small filamentous or thaloid gametophytes (prothalli) bearing archegonia and antheridia on either the same or different prothalli.

LYCOPSIDA

I. SELAGINELLACEAE

Herbs with creeping or rarely erect stems. Leaves numerous, small, simple, 1-veined, with a ligule on the adaxial surface. Heterosporous; sporangia grouped in strobili; individual sporangia solitary in the axils of the sporophylls, unilocular; spores tetrahedral.

1. *Selaginella* Beauv.

Leaves either all similar and spirally arranged, or dimorphic and 4-ranked, the lower patent, the upper appressed and pointing forwards. Strobili terminal; megasporangia at the base and microsporangia at the apex of the strobilus.

1. *S. denticulata* (L.) Link Plate I Toothed-leaved Clubmoss

Stem 4-10 cm. long, creeping, flattened and dorsiventral, not articulated, very slender, much branched. Leaves up to 2.5 mm. long, dimorphic, 4-ranked, the lower larger, ovate, acuminate, markedly dentate and slightly asymmetrical. Strobili not more than 2 cm., sessile, not sharply defined at the base. $2n = 18$.

Mossy, moist rocks on shady slopes of the valleys. *Malta*: infrequent (G. Lanfranco); at Wied Ghomor (S. & C.G.; Borg); Wied Qirda and valleys near Mellieha (Duthie; Borg); Ghajn Ingraw (Borg). *Gozo*: Nadur, San Blas and Xlendi (Borg).

Mediterranean region and Atlantic Islands.

(According to Borg (p. 89) *Psilotum nudum* (L.) Swartz of the Psilotaceae, a native of the tropics, has been repeatedly found in glasshouses at Lija.)

II. ISOETACEAE

Stems short, 2- or 3-lobed. Leaves in a rosette; leaf-base spatulate with a membranous margin, and a delicate ligule on the adaxial surface at the point where the leaf narrows. Heterosporous; megasporangia tetrahedral, microspores bilateral, in separate sporangia.

1. *Isoetes* L.

Aquatic or terrestrial plants. Leaves terete or trigonous, subulate, occasionally flat and linear, often without stomata. Sporangia solitary, sessile, naked, or covered with a thin tissue (velum).

1. *I. histrix* Bory Plate I Sand Quillwort
I. histrix auct.

Terrestrial; stem 3-lobed. Leaves 5-10 cm. long x 0.5-1.0 mm. wide, more or less flat, linear; stomata numerous; membranous margin wide at base, narrowing

abruptly just above the sporangium, but continuing up the leaf for 1-2 cm.; leaf bases persistent over several years as black, shiny, horny scales with central, short broad lobe and two longer lateral, often spine-like ones. Sporangium completely covered by velum; megaspores $400-560 \mu$, with small tubercles which often become confluent, especially on the basal surface; microspores brown, spinulose. $2n = 24$.

Among rocks where winter rain accumulates. *Malta*: rare, no localities given (Borg; Armitage).

Mediterranean and Atlantic coasts of Europe, northwards to 50°N .

SPHENOPSISIDA

III. EQUISETACEAE

Stems grooved and jointed. Leaves in whorls, united into a sheath at the base. Homosporous; sporangiophores in cones; sporangia borne on the adaxial side of the petiole heads of the sporangiophores; spores with 4 elaters. Prothallus green.

1. *Equisetum* L.

Stems usually with a hollow in the centre surrounded by 2 rings of alternating smaller cavities. Leaves small, usually brownish. Cones borne at the ends of the main stems and sometimes of the branches also.

1. *E. ramosissimum* Desf.

Plate I

Denb iż-żiemel
Branched Horsetail

Stem 10-100 cm. high \times 3-9 mm. wide; usually dying in the autumn, freely branched, and with scattered tubercles; grooves 8-20; sheaths green, becoming brown with a dark band at the bottom; teeth as many as grooves; dark, with narrow scarious border; central hollow half to two thirds the diameter of the stem. Branches hollow; the lowest internode much shorter than the sheath on the main stem. Cone 6-12 mm. long. $2n = c.216$.

Damp places in fields, shaded valleys and along walls. *Malta*: frequent (G. Lanfranco; Wolseley); as at Ta' Baldu, Mtaħleb, Għirgenti, Salina, Gnejna etc. (S. & C.G.); Buskett, Għajn il-Kbira, Għajn Tuffieħa, Wardija, San Martin, etc. (Borg). Salina, Golden Bay etc. ((Haslam). Gozo: not rare; Wied Bingemma, Marsalforn, Wied il-Lunziata (S. & C.G.); Xlendi, Mgarr ix-Xini etc. (Borg).

C. & S. Europe, extending locally northwards to England, the Netherlands, Latvia and C. Russia.

FILICOPSIDA

IV. ADIANTACEAE

Rhizomes solenostelic, with opaque scales. Petioles dark and shining, with 2 vascular strands at the base, which unite to form a single 4-angled strand distally. Sori borne on the deflexed leaf-margins; spores tetrahedral.

1. *Adiantum* L.

Rhizomes with narrow brown scales. Petioles with scales at the base only; lamina wide, pinnately compound, herbaceous, glabrous; veins free. Sori in parallel

linear groups of 2-10 on the lower side of the pinnules, along and between the parallel veins.

1. *A. capillus-veneris* L.

Plate I

Tursin il-bir
Maidenhair-fern

Leaves 10-60 cm. long, ovate to ovate-lanceolate in outline, 2- or 3-pinnate; petiole up to 25 cm. long, black and shining; lamina bright green, of delicate texture; pinnules cuneate, flabellate, on fine capillary stalks, very variable in form and size. $2n = 60$.

On the walls of wells and caves and among damp rocks in shaded valleys. *Malta* and *Gozo*: frequent (S. & C.G.; Borg; Wolseley); also *Comino* (Borg).

Tropical and warm temperate zones of nearly the whole world.

(*Pteris cretica* L. and *P. vittata* L. (*P. longifolia* L.) of the *Pteridaceae* are recorded by Borg as being naturalized in gardens).

V. GYMNOGRAMMACEAE

Rhizomes solenostelic, with opaque scales. Petioles with 2 vascular strands. Sporangia-seriate along the veins, and not in well-defined sori, without indusium; spores tetrahedral.

1. *Anogramma* Link

Sporophyte annual; gametophyte said to be perennial. Stock very short; scales few. Leaves weakly dimorphic, 2- to 3-pinnate, margins flat; veins free. Sori spread along the veins.

1. *A. leptophylla* (L.) Link

Gymnogramma leptophylla (L.) Desv.

Tursin il-rif
Annual Maidenhair

Stock with a few scales when young. Leaves slightly hairy when young, glabrescent; the sterile outer much shorter than the fertile inner which have thin obovate-cuneate pinnules, lobed or dentate at the apex. Sori appearing confluent when mature.

On moist walls, rocks and other damp places. *Malta*: infrequent (G. Lanfranco); as at Ta' Baldu, Wied Babu, Wied Incita, Buskett, San Anton Gardens, Gnejna etc. (S. & C.G.); Wied il-Għasel etc. (Borg); Maqluba (Wolseley). *Gozo*: Xlendi, Ta' Cenċ, Nadur, Għajnsielem etc. (Borg).

Mediterranean region, north to Caucasus, Crimea, Switzerland and Channel Islands; Macaronesia; Abyssinia, S. Africa, Madagascar; India; Australia, New Zealand; America from Mexico to Argentina.

VI. HYPOLEPIDACEAE

Rhizomes with a perforated solenostele and covered with hairs. Petioles with several vascular strands which fuse to form a single U-shaped strand. Sori marginal, borne on the connecting veinlet, and covered by both the deflexed margin of the leaf and by an inner indusium; spores tetrahedral.

1. *Pteridium* Scop.

Rhizomes subterranean, long. Leaves distant; petioles long; lamina 3-pinnate; lower

pinnac with nectaries at base; ultimate segments numerous, ovate to linear. Sori contiguous, on the marginal vein, covered both by the revolute leaf-margins and by the indusia.

1. *P. aquilinum* (L.) Kuhn
Pteris aquilina L.

Plate I

Felci
Bracken

Leaves 40-400 cm. long, ovate-triangular, more or less woolly on the lower surface, glabrous or almost so on the upper; margins glabrous; petiole tomentose at base, becoming glabrous above; pinnules shortly acuminate to obtuse, usually almost at right angles to the costa. Indusium ciliate. $2n = 104$.
On clayey soils. Gozo: San Blas, Rdum il-Kbir (Borg).
Cosmopolitan.

VII. ASPLENIACEAE

Rhizomes dictyostelic, with clathrate scales. Petioles with 2 vascular strands often fusing to form a single X-shaped strand. Sori superficial, borne along one or both sides of the fertile veins; spores bilateral.

1. Lamina entire (or undulate)
Lamina pinnate or pinnatifid

2. Lamina with dense light brown scales on the lower surface
Lamina without scales, glabrous or nearly so

3. Phyllitis

2. *Ceterach*
1. *Asplenium*

1. *Asplenium* L.

Rhizomes short, erect or occasionally creeping, with dark, linear-triangular to linear-lanceolate, sometimes filiform scales. Leaves in apical tufts; petiole dark, at least at the base, often glabrous; lamina entire or variously dissected; veins free. Sori elliptical to linear; indusium resembling the sorus in shape and size, usually opening towards the vein.

- Rhachis with green wings; pinnae 1-4 cm. long
Rhachis with pale brown wings; pinnae 0.25-1.2 cm. long

1. *marinum*
2. *trichomanes*

1. *A. marinum* L.

Plate I

Sea Spleenwort

Plant robust. Rhizome with filiform scales at apex. Leaves 15-30 (-40) cm. long; petiole about half as long as lamina, reddish-brown; lamina linear-lanceolate; pinnate, coriaceous, glabrous; rhachis with green wings; pinnae 1-4 cm. long, oblong, more developed on the upper side, crenate-serrate, base truncate or broadly cuneate, apex rounded. $2n = 72$.

In humid and shady places, at the bottom of a few of the valleys. Malta: rare (G. Lanfranco); as at Wied il-Ghasel, Wied iz-Zurrieq (S. & C.G.; Borg); Mellieha (Borg). Gozo: Xlendi, Rdum il-Kbir (S. & C.G.; Borg); Mgarr ix-Xini (Duthie; Borg); Qala Dwejra (Borg; Gulia fil.).

W. Europe, extending eastwards very locally to S. Italy, and south to N. Morocco and Macaronesia.

2. *A. trichomanes* L.

Common Spleenwort

Rhizome caespitose; scales up to 5 mm. long, with a dark central stripe. Leaves 4-20 (-35) cm. long; petiole about a quarter as long as the lamina, dark reddish-brown; lamina pinnate, thick and dark green, with occasional glandular hairs beneath, or glabrous; rhachis dark reddish-brown to the apex, with a narrow, pale brown wing; pinnae 0.25-1.2 cm. long, ovate, oblong or rarely suborbicular, entire or crenate-serrate, base truncate or asymmetrically cuneate, apex rounded. Sori small, linear, but sporangia covering pinna at maturity.

On rocks. Malta: rare, Wied Babu (Gulia; Borg); Ghajn Riħana (Borg). Gozo: Mgarr ix-Xini (Duthie; Borg).

Throughout Europe, extending to the Ladoga-Ilmen and Volga-Kama regions of Russia.

2. *Ceterach* DC.

Small, xerophilous. Rhizomes short. Leaves tufted, pinnatifid, thick, glabrous above, densely scaly beneath; veins of the leaf-segments pinnate and forked, anastomosing near the margin. Sori linear; indusium rudimentary or absent.

1. *C. officinarum* DC.

Plate I

Rusty-back Fern

Leaves 3-25 cm. long, persistent, oblong; petiole short, one sixth to a quarter as long as the lamina, covered with scales; lamina greyish to dark green above, covered with light brown, overlapping scales beneath; leaf-segments alternate, ovate or oblong, 9-12 on each side, entire or crenate, rounded at the apex. Sori c. 2 mm. Mean spore-length 41-48 μ . $2n = 144$.

Rock crevices. Malta: rare (G. Lanfranco); as at Wied il-Ghasel (S. & C.G.; Borg); Wied Ghar Dalam (S. & C.G.; Penza); Wied Ghomor (Gulia fil.; Borg); Ghajn Mula (Borg). Gozo: Xlendi (Gulia fil.; Borg).

Mediterranean region extending east and north to the Himalaya, Tien-Shan, Caucasus, Crimea, Gotland, C. Germany, Belgium and British Isles; Madeira.

3. *Phyllitis* Hill

Rhizomes short. Leaves simple or slightly lobed, with free veins. Sori oblong to narrowly linear, arranged in opposite pairs, those of two neighbouring veins parallel and close, and ultimately appearing like a single sorus; indusia linear, each attached on one side of the receptacle, those of a pair opening towards each other.

- Lamina entire, not auricled or lobed at base
Lamina with projecting lobes or auricles at base

1. *scolopendrium*
2. *sagittata*

1. *P. scolopendrium* (L.) Newman

Hart's-tongue Fern

Asplenium scolopendrium L.; *Scolopendrium vulgare* Sm.

Leaves 10-60 cm. long, persistent; petiole up to half as long as the lamina; lamina 3-6 (-7) cm. wide, linear-lanceolate, cordate at the base, margin slightly undulate, entire. Sori 8-18 mm. wide, linear, usually occupying more than half the width of the lamina. $2n = 72$.

Moist, shady rocks and in wells. Malta: rare (G. Lanfranco); as at Wied Babu, Wied Ghomor, Wied il-Ghasel (Borg).

Europe from Scandinavia (rare), C. Germany and S.W. Russia southwards; mountains of Morocco; Macaronesia; Asia Minor to Caucasus and Persia; Japan.

2. *P. sagittata* (DC.) Guinea & Heywood
P. hemionitis O. Kuntze;
Scolopendrium hemionitis Swartz

Plate I

Leaves 12-30 cm. long, tufted, persistent; petiole half as long as or equal to lamina; lamina oblong-lanceolate, deeply cordate and auricled at base; auricle of young leaves rounded, of mature leaves triangular, more or less lobed, sometimes projecting horizontally for 3-4 cm., and leaves then hastate. Sori elliptic, shorter and wider than in *P. scolopendrium*. $2n = 72$.

Moist, shady rocks and in wells and caves. *Malta*: Mellieha; in many wells at Mosta, Birkirkara, Ghajn Tuffieha (Borg). *Gozo*: Rdum il-Kbir, Qala, Ghajnsiela Dwejra, Xlendi (Borg).

Mediterranean region.

SPERMATOPHYTA

GYMNOSPERMAE

Usually evergreen trees or shrubs. Leaves acicular or scalelike, more rarely broader and then ovate to lanceolate. Xylem without vessels (except in *Gnetum*). Flowers unisexual. Ovules not enclosed in an ovary.

CONIFEROPSIDA

CONIFERALES

VIII. PINACEAE

Monoecious resiniferous trees, rarely shrubs, with spirally arranged leaves. Flowers (cones) made up of numerous spirally arranged scales. Scales of male cones (microsporophylls) bearing 2 pollen-sacs on the lower surface. Scales of female cones (megasporeophylls) made up of two parts, an upper ovuliferous scale (cone scale) bearing 2 ovules on the upper surface, and a lower, subtending scale (bract). Fruit a cone which is usually woody. Seeds winged.

1. *Pinus* L.

Evergreen trees or shrubs with regularly whorled branches. Twigs of two kinds: long shoots bearing scale-like leaves, and deciduous short shoots bearing acicular leaves in clusters of 2-5(-8). Resin-canals 2 or more, varying in position. Male flowers catkin-like, clustered at the base of the young twigs. Cones ripening in the second or third year, eventually falling in their entirety, cylindrical to ovoid; ovuliferous scales woody; bracts minute; the exposed part of the scales (apophysis) with a prominent protuberance (umbo), usually ending in a spine or prickle.

1. *P. halepensis* Miller

Plate II

Znuber, Prinjohn
Aleppo Pine

Tree up to 20 m. high; with a rounded crown; trunk and branches often crooked; bark silvery-grey, becoming reddish-brown and deeply fissured. Twigs glabrous, remaining light grey for many years. Buds not resinous. Leaves 60-150 mm. long x 0.7 mm. wide, in pairs, slender, clear green, with 1.3 layers of hypodermal cells; resin-canals 3-8, submarginal (sometimes with 1.2 median).

Feld
Mules

Leaves 12 mm. long x 4 cm. wide, shining, brown; apophysis convex; peduncle 1-2 mm. long, recurved. Seed c. 7 mm. long; wing c. 20 mm. long. Fl. 3-5.

Formerly native at Ghajn Znuber near Mellieha, and at Wied Znuber near Birkirkara (Borg). Frequently found as a cultivated tree, both as individuals and in plantations (Borg; G. Lanfranco; Haslam; Wolseley). Naturalised between Ghajn Znuber and Buskett (Wolseley) and elsewhere (G. Lanfranco).

Mediterranean region.

Pinus peuce L. the Stone Pine, often occurs as a planted tree (Borg.).

IX. CUPRESSACEAE

Monoecious or dioecious; resiniferous trees or shrubs with opposite or whorled, usually scale-like, leaves. Flowers (cones) made up of opposite or whorled scales. Scales of male cones (microsporophylls) bearing 3-5 pollen sacs on the lower surface. Scales of female cones (megasporeophylls) bearing 2-many erect ovules on the upper surface, and completely adnate to the subtending bract. Fruit a more or less woody cone, or rarely the scales becoming fleshy and the fruit berry-like, indehiscent. Seeds winged or not.

Cone scales in 3-8 pairs

1. *Cupressus*

Cone scales 4, in a single whorl

2. *Tetraclinis*

1. *Cupressus* L.

Monoecious trees (rarely shrubs). Twigs terete or 4-angled. Leaves opposite, decussate; scale-like, appressed and imbricate on adult plants; acicular and patent in young plants and rarely on leading shoots. Cones solitary, terminal on young twigs, ripening in the second year, globose to ellipsoid-globose; cone scales in 3-7 pairs, peltate, woody. Seeds flattened, 6-20 on each side, narrowly winged.

1. *C. sempervirens* L.

Plate II

Cypress kannella
Cypress

Tree up to 30 m. high. Leaves 0.5-1 mm. long, dark green, obtuse. Male cone 13 mm. long; female 25-40 mm. long, ellipsoid-oblong (rarely globose), green when young and shining yellowish-grey when ripe, with 8-14 shortly and obtusely mucronate scales. Seeds 8-20 on each scale.

There are two well-known forms: forma *sempervirens* (var. *pyramidalis* (Targioni-Tozzetti) Nyman) with upright branches forming a fastigiate crown and forma *horizontalis* (Miller) Voss with patent-ascending branches forming a pyramidal crown.

Malta and *Gozo*: Widely planted and often naturalized (e.g. Buskett) (Borg, Haslam).

Long planted throughout the Mediterranean region from N. Persia to Spain, its natural range being difficult to define.

2. *Tetraclinis* Masters

Monoecious tree. Buds concealed by the leaves. Twigs flattened. Leaves in fours, the lateral ones larger than the others, all adnate to the twig except at

the scale-like apex. Cones solitary; scales 4, in a single whorl, valvate, woody. Seeds with 2 wide wings.

1. *T. articulata* (Vahl) Masters Plate II Gharghar
Callitris articulata (Vahl) Ascherson & Graebner

Pyramidal tree 12-15 m. high. Cone 8-12 mm. in diameter; scales glaucous, triangular, 2 obtuse and 2 acute at apex, deeply grooved, with a small spine near the apex.

Malta: Very rare (G. Lanfranco); as at Maqluba near Qrendi, Wied Filep, Ghajn Rihana (Borg); formerly much more common (Borg); Argotti Botanic Gardens (Haslam).

A few plants remain on the rock faces of Maqluba and one plant at Wied Filep above the quarry (Wolseley). This tree is the Gharghar a Juniper tree referred to by Ciantar Abela in 1772 as formerly being common on the island and still occurring over a large area including Birkirkara, Sliema and St. Julians. Place names such as Gharghur indicate the former existence there of this tree.

Algeria, Morocco, Mogador and an isolated locality in S.E. Spain near Cartagena.

X. ARAUCARIACEAE

Evergreen trees with whorled branches. Leaves spirally arranged, needle-like or broad and flat. Flowers usually dioecious, both sexes in cones of spirally arranged scales. Microsporophylls with 5-15, pendulous pollen-sacs. Scales of female cone numerous, the bract large and woody, the scale (ligule) fused to it; ovule centrally placed, inverted.

1. *Araucaria* Juss.

Leaves needle-like or flat and lanceolate. Seeds adnate to the bract and falling with it.

1. *A. heterophylla* (Salisb.) Franco Plate II Awrikarja khira
Norfolk Island Pine

Tree 50-65 m. high, with main branches horizontal or pendulous. Leaves of two kinds, those on juvenile shoots soft, awl-like, incurved, bright green, those on older and fertile shoots dense, overlapping, broadly ovate. Cones 7.5-10 cm. x 9-11.5 cm., often broader than long.

Frequently planted. Malta: San Anton Garden, Argotti, Balluta, Addolorata, Buskett, St. Julians etc. (Haslam).

Norfolk Island.

GNETOPSIDA

GNETALES

XI. EPHEDRACEAE

Dioecious; shrubs with opposite or whorled leaves, usually reduced to short, more or less coalescent sheaths; not resiniferous. Inflorescences axillary, on short shoots. Flowers enclosed in 2-4 membranous perianth-segments. Fruit a globose syncarp formed from 1 or 2 seeds, surrounded by 2 pairs of red or yellow fleshy bracts.

1. *Ephedra* L.

Twigs green. Male flower with free perianth-segments and a few 2- to 3-celled microsporangia, opening by apical, horizontal slits. Female flowers with connate perianth-segments; ovule orthotropous, with integument prolonged into a slender tube.

1. *E. fragilis* Desf.

Plate II

Shrubby Horse-tail

Scrambling up to 5 m. or procumbent. Leaves up to 2 mm. long, with green back. Male inflorescence subsessile, ovoid, with 4-8 pairs of flowers; bracts firm, suborbicular. Female inflorescence 1- to 2-flowered, with 2-3 pairs of bracts. Tube of integument 3 mm. long. Fruit 8-9 mm. long, red. Fl. 3-4.

On rocks. Malta: Very rare (Borg); Wardija (GD.); Argotti Botanic Gardens (Haslam).

Mediterranean region; S. Portugal; Atlantic Islands.

SPERMATOPHYTA

ANGIOSPERMAE

DICOTYLEDONS

Trees, shrubs or herbs, rarely parasitic or saprophytic. Xylem with vessels. Flowers hermaphrodite or unisexual. Ovules enclosed in an ovary. Seeds with 2 cotyledons, rarely 1 by abortion.

SALICALES

XII. SALICACEAE

Dioecious. Trees or shrubs. Leaves alternate, very rarely sub-opposite; stipules present. Flowers subtended by bracts and arranged in catkins; perianth absent; filaments filiform, free or more or less united. Female flowers with one unilocular carpel with 2-4 parietal placentae; ovules numerous, ascending, anatropous. Fruit a capsule dehiscing by 2-4 valves. Seeds numerous, very small, each with a tuft of long hairs.

Buds with 1 outer scale; bracts entire

1. *Salix*

Buds with several outer scales; bracts dentate or ciliate-fimbriate

2. *Populus*

1. *Salix* L.

Buds with one outer scale. Leaves variously shaped. Flowers entomophilous, appearing before or after the leaves, in catkins, each flower with one or two small nectaries and subtended by an entire bract. Stamens usually 2, 3 or 5. Capsule 2-valved. Seeds numerous.

Bracts uniformly yellowish; leaves appressed hairy on both surfaces; male flowers with 2 nectaries

1. *alba*

Bracts with a dark apex; leaves thinly pubescent beneath, glabrescent above; male flowers with a single nectary

2. *pedicellata*

1. *S. alba* L.

Safsafa
White Willow

Tree up to 25 m. high, often pollarded. Branches ascending, appearing silvery-grey in life. Bark greyish, not flaking. Twigs silky when young, later glabrous and olive, not easily breaking off. Leaves 5-10 cm. long, usually 5.5-7.5 times as long as wide, acuminate, not or slightly asymmetrical at the apex, cuneate at base, finely serrate, covered with white, silky, appressed hairs on both surfaces; petiole without glands. Stipules usually caducous. Catkins appearing with the leaves, dense, cylindrical. Bracts uniformly yellowish. Stamens 2, free; anthers yellow. Male flowers with 2 nectaries; female flowers usually with 1 nectary. Fl. 3-4.

Most trees are referable to subsp. *alba* which has the twigs brown or yellow-brown and erect, and the leaves covered on both surfaces with appressed silky hairs, and more or less glabrescent above. Subsp. *vitellina* (L.) Arcangeli with the twigs bright yellow or orange, thin and sometimes pendulous, and the leaves paler green and with less indumentum was recorded from Gnejn il-Kbir by Borg. Along streams. *Malta*: Gnejn il-Kbir (S. & C.G.; Borg); Buskett (Gulia; Borg); Mtahleb (Borg; Penza); Girgenti (S. & C.G.).

Europe except the Arctic; N. Africa; W. Asia from W. Siberia to the Himalaya and Palestine. Often planted.

(According to Borg, *S. babylonica* L. is sometimes planted).

2. *S. pedicellata* Desf.

Plate II

Safsafa
Mediterranean Willow

S. aurita var. *pedicellata* (Desf.) Fiori

Tall shrub or tree up to 10 m. high. Decorticated wood with numerous prominent ridges. Young twigs grey-tomentose, older ones gradually glabrescent. Leaves oblong or obovate-lanceolate, dentate, crenate or nearly entire, thinly pubescent beneath, glabrescent above; lateral veins at least 10-12 pairs, connected by a fine reticulation, prominent beneath, impressed above. Stipules large, semi-cordate, dentate, deciduous. Bracts with a dark apex, shortly hairy. Catkins 3-6 cm. long x 1-1.5 cm. wide. Ovary glabrous; pedicel 3-4 mm. long; style short or moderately long. Male and female flowers each with a single nectary. Fl. 1-2.

Along streams. *Malta*: rare, Mtahleb, Gnejna (S. & C.G.; Borg); Marsa (G.D.; Borg); Ghajn il-Kbira (Gulia; Borg); Bahrija, Wied Gerżuma (Borg).
Mediterranean region.

2. *Populus* L.

Deciduous trees. Buds with several unequal scales. Leaves usually ovate or triangular, entire, dentate or lobed. Petiole usually long, terete or flattened. Flowers anemophilous, appearing before the leaves, in pendulous stalked catkins, each flower with a stalked, cup-shaped disc and subtended by a toothed or laciniate bract. Stamens 4 to many. Capsule 2- to 4-valved. Seeds numerous, minute.

1. *P. alba* L.

Plate II

Luq abjad
White Poplar

Tree up to 30 m. high with a broad crown; suckering freely. Bark white on young stems. Twigs and buds white-tomentose. Leaves of long shoots 6-12 cm.

long, ovate, with 3-5 coarsely toothed lobes, dark green above, white-tomentose beneath; leaves of short shoots ovate to elliptic-oblong, sinuate-dentate, usually greyish beneath. Stamens 6-10. Fruiting catkins 8-10 cm. long. $2n = 38$. Fl. 2-3. According to Borg var. *nivea* Aiton, with smaller leaves which are lighter green with a dense silvery-white tomentum beneath, is sometimes naturalized.

Along streams and in damp places. *Malta*: rather frequent, Girgenti, Buskett, Wied ir-Rum, Bingemma, Bahrija etc. (S. & C.G.; Borg); Wied il-Baruni (Gulia); Ghajn il-Kbira (Borg); Chadwick Lakes (Haslam); Wied Hazrun; Ta' Gholjia (Wolseley). *Gozo*: Mgarr (S. & C.G.; Borg).

C. E. & S.E. Europe; W. Asia; N. Africa; often planted elsewhere.

(According to Borg *P. nigra* L. and *P. tremula* L. are sometimes cultivated.)

FAGALES

XIII. FAGACEAE

Monococious trees or shrubs. Leaves simple, alternate. Male flowers in catkins or heads; perianth 4- to 6-lobed; stamens 8-20, usually twice as many as perianth-lobes. Female flowers 1-3, surrounded by an involucre of scales (cupule); perianth 4- to 6-lobed; styles 3 or 6. Fruit a 1-seeded nut, in groups of 1-3, surrounded by the accrescent cupule.

1. *Quercus* L.

Trees or shrubs. Buds ovoid. Leaves usually dentate, sinuate or pinnately lobed, rarely entire; evergreen (persisting for more than a year), semi-evergreen (persisting green through the winter, but falling in spring), or deciduous (withering in autumn, though sometimes not falling till spring). Flowers anemophilous. Male catkins slender, pendulous; bracts minute, caducous; flowers numerous, with usually 6-lobed perianth and 6-12 stamens. Female catkins with few flowers, each solitary in an involucre. Styles 3-6. Fruit an oblong or ellipsoidal nut, its base enclosed by the enlarged involucre (cupule). Germination hypogeal.

Leaves evergreen, dark-green above, grey and tomentose below, entire or serrate

1. *ilex*

Leaves deciduous, green, lobed

2. *robur*

1. *Q. ilex* L.

Plate III

Ballut
Evergreen Oak, Ilex

Evergreen tree or shrub up to 25 m. high; twigs and buds grey-tomentose. Leaves 3-7 cm. long, thick but not rigid, oblong-ovate to lanceolate, with cuneate or rounded base, entire, mucronate-dentate or spinose-serrate, dark green, glabrescent and smooth above, grey-tomentose and with prominent veins beneath; midrib straight; lateral veins 7-11 pairs; petiole 6-15 mm. long; stipules subulate, densely hairy. Perianth-lobes lanceolate, subacute; anthers mucronate. Fruit bitter, ripening in the first year; scales of involucre appressed, flat. $2n = 24$. Fl. 4-5.

Rocky valleys. *Malta*: rare, Wied Hazrun, Buskett, where it is regenerating (Haslam) and Ballut (Wardija); (S. & C.G.; Borg). Planted for ornament, Floriana, Argotti etc. (Haslam). The Maltese name Ballut, Balluta occurs in many places, and is presumably due to former existence there of this species. At Wied Hazrun there are few trees left, but at Ballut (Wardija) the trees are of great size and regeneration is occurring outside the wood (Wolseley).

Mediterranean region, extending to Portugal, N. Spain and W. France. Planted elsewhere in W. & S. Europe and rarely naturalized.

2. *Q. robur* L.
Q. pedunculata Ehrh.

Balluta Ingliza
Common Oak

Deciduous tree up to 45 m. high, glabrous except sometimes for pubescence on young twigs and lower surface of young leaves. Leaves usually obovate, with 5-7 pairs of lobes; lateral veins making a variable angle with the mid-rib, with several intercalary veins; petiole 5 mm. long or less. Peduncle usually long; scales of involucre flat, puberulent, conrescent except for the apices.

Often cultivated and sometimes self-sown (Borg). Malta: planted for ornament as at Buskett (regenerating), Argotti (Haslam), Bur Marrad, Msida (Wolseley).

Most of Europe, except the extreme north and parts of the Mediterranean region.

(Borg says the Hazel, *Corylus avellana* L. is sometimes cultivated, but rarely fruits).

URTICALES

XIV. ULMACEAE

Deciduous trees, rarely shrubs, without latex. Leaves alternate, simple, asymmetrical at base. Flowers all hermaphrodite or male and hermaphrodite. Perianth herbaceous; stamens erect in bud. Fruit a drupe or samara.

1. *Ulmus* L.

Ulmus
Elm

Bark fissured. Flowers all hermaphrodite appearing before the leaves on the previous year's growth. Perianth-segments connate. Anthers purplish-red. Fruit a samara, winged all round but the wing emarginate at the apex.

It is not certain to which species the elms of Malta belong. It is possible that trees described by Borg as *U. campestris* L. from rocky places in the Għien il-Kbir valley are native, and may be referable to *U. canescens* Melville which is native in Sicily. A specimen collected by Wolseley (Plate III) from Bur Marrad has been determined as *U. minor* Miller sensu lato by R.H. Richens. It would probably be included in *U. canescens* by Melville, but is not so pubescent as characteristic examples of that species. It is also highly likely that other European elms have been introduced, and the situation may be as complex as on the Continent itself.

XV. MORACEAE

Trees or shrubs with latex. Monoecious or dioecious. Leaves alternate (rarely opposite); stipules caducous. Flowers usually densely spicate, capitate or enclosed in a fleshy, urceolate receptacle (fig). Male flowers with 3- to 4-partite perianth and 3-4 stamens opposite the perianth-segments. Female flowers with 3- to 4-partite perianth; ovary 1- or 2-locular, superior; styles 2 (1). Ovary anatropous or campylotropous. Fruit a drupelet often surrounded by the fleshy perianth; drupelets often crowded into syncarps.

1. Stipule-scar encircling the stem; stamens straight in bud; fruits borne on the inside of a fleshy pyriform structure

3. *Ficus*

Stipule-scar not encircling the stem; stamens inflexed in bud; fruits borne on a short axis

2. Buds with 2-3 scales; syncarp globose

2. *Broussonetia*

Buds with 3-6 scales; syncarp cylindrical or ovoid

2. *Morus*

1. *Broussonetia* L'Her. ex Vent.

Buds with 2 or 3 scales. Dioecious. Male flowers in catkin-like inflorescences; perianth 4-partite; stamens 4, inflexed in bud. Female flowers in dense, globose, tomentose heads; perianth denticulate, with 4 very small teeth, forming a layer of pulp in fruit.

1. *B. papyrifera* (L.) Vent.

Plate III

Paper Mulberry

Small trees; young twigs villous. Leaves 7-20 cm. long, ovate, serrate, sometimes lobed, scabrid above, grey tomentose beneath. Syncarps about 2 cm. in diameter, orange, with red fruits.

Malta: Cultivated and often freely reproducing itself by suckers and becoming naturalised at San Anton (Borg) and Addolorata (Borg, Gauci).

Native of China, but widely cultivated.

2. *Morus* L.

Monoecious or dioecious. Flowers of both sexes in short, dense spikes. Perianth of male flowers 4-partite; stamens 4, inflexed in bud. Perianth of female flowers becoming fleshy in fruit.

Leaves pubescent beneath; syncarp subsessile

Leaves almost glabrous beneath; peduncle about as long as syncarp

1. *nigra*

2. *alba*

1. *M. nigra* L.

Tuta
Black Mulberry

Tree with stout rough branches. Leaves 6-20 cm. long, broadly ovate-cordate, dentate or lobed, scabrid above, pubescent beneath. Syncarp 2-2.5 cm. long, dark purple, very acid until completely ripe.

Formerly cultivated for its fruit (Borg); still associated with farmsteads (Wolseley); Buskett (Haslam). Native of China.

2. *M. alba* L.

Plate II

Cawshi bajda
White Mulberry

Tree with slender smooth branches. Leaves 6-18 cm. long, ovate, rounded or obliquely cordate at base, dentate or lobed, usually smooth above, glabrous or pubescent on the veins only beneath. Syncarp 1-2.5 cm. long, white, pinkish or purplish, edible long before it is ripe.

According to Borg often cultivated for its fruits, for ornament and for the rearing of the silk-worm (*Bombyx mori*), and sometimes found self-sown. Still found associated with farmsteads (Wolseley). Native of C. Asia.

3. *Ficus* L.

Leaves usually lobed; buds enclosed in the connate stipules. Stipules caducous, leaving a circular scar. Monoecious. Flowers enclosed within a fleshy urceolate structure. Stamens 4, straight in bud.

1. *F. carica* L.

Plate III

Sigra tat-tin
Fig

Spreading, deciduous shrub or small tree. Leaves 10-20 cm. long and wide, usually palmately lobed, usually cordate at base, scabrid, sparsely hispid beneath. Syncarp 5-8 cm. long, pyriform, greenish- or brownish- violet. Fl. 5-6.

Many cultivars exist and the wild plant, var. *caprificus* Risso also shows considerable variability.

Rocky places and old walls. *Malta* and *Gozo*: Wild plants are common in the valleys, and on rocky ground. It is cultivated in many places (S. & C.G.; Borg). Still common (G. Lanfranco; Sell; Wolseley).

Extensively cultivated and widely naturalized in the Mediterranean region and Near East as far as North India. Its native distribution is difficult to ascertain.

F. microcarpa L. fil. (*F. nitida* auct., non Thunb., *F. retusa* auct., non L.), *Fiku* is widely planted in towns (Valletta, Haslam; Wolseley).

XVI. URTICACEAE

Herbs, small shrubs or rarely climbers, without latex. Leaves opposite or alternate, simple, usually stipulate. Flowers usually unisexual. Perianth 4- to 5-merous, often persistent. Male flowers with (1-) 4-5 stamens opposite the perianth-segments and inflexed in bud, often with rudimentary ovary. Female flowers often with small staminodes; ovary superior, 1-locular, sometimes adnate to perianth; style simple; ovule 1, orthotropous. Fruit an achene. Seeds usually with endosperm; embryo straight.

Leave opposite, variously toothed or lobed, rarely entire

1. *Urtica*

Leaves alternate, entire

2. *Parietaria*

1. *Urtica* L.

Annual or perennial herbs, usually with stinging hairs. Leaves opposite, usually deeply lobed or variously toothed; stipules free. Inflorescence axillary, spike-like, with clustered cymes. Flowers unisexual. Perianth 4-merous. Female flowers with more or less unequal perianth-segments, the 2 larger enclosing the achene.

1. Stipules 2 at each node
Stipules 4 at each node

2. *dubia*
2.

2. Racemes with numerous female and few male flowers

1. *urens*

Racemes unisexual, female long-pedunculate with flowers in globose heads, male spicate

3. *pilulifera*

1. *U. urens* L.

Hurrieq 2ghir
Small Nettle

Annual 10-60 (-80) cm. high, clear green; monoecious. Leaves 1-4 (-6) cm. long, ovate, cordate to cuneate at base, deeply serrate; petiole about two thirds as long as lamina; stipules 4 at each node. Racemes not more than 1.5 (-2) cm. long, with numerous female and few male flowers, erecto-patent in fruit. Perianth-segments of female flowers ciliate on the margin, glabrous or sparsely hispid on the back. $2n = 24, 26, 52$. Fl. 12-4.

Arable and waste places, near habitations, along streets etc. *Malta* and *Gozo*: less common than *U. dubia* (S. & C.G.; Borg; G. Lanfranco; Wolseley); *Comino*: (Borg). North Temperate regions.

2. *U. dubia* Forskal

Plate IV

Hurrieq komuni
Large-leaved Nettle

U. membranacea Poiret; *U. neglecta* Guss.

Annual 15-80 cm. high; monoecious. Leaves 2-6 (-10) cm. long, ovate, subcordate at base, serrate; petiole almost as long as the lamina; stipules 2 at each node. Racemes usually unisexual; the lower female, shorter than petiole; the upper male, longer than petiole, erecto-patent, sometimes bisexual; the flowers inserted unilaterally on an inflated axis. Fl. 11-5.

Near habitations, along streets and particularly abundant in gardens and cultivated places. *Malta*, *Gozo* and *Comino*: very common (S. & C.G.; Borg). Mediterranean region, Portugal, Atlantic Islands.

3. *U. pilulifera* L.

Hurrieq taż-żibog
Roman Nettle

Annual 30-100 cm. high; monoecious. Leaves 2-6 cm. long, ovate, truncate to subcordate at the base, serrate or entire; petiole almost as long as the lamina; stipules 4 at each node. Racemes unisexual; female long-pedunculate with flowers in globose heads; male spicate. Female flowers with inflated perianth. Fl. 2-5.

Arable and waste places. *Malta*: common (S. & C.G.; Borg; G. Lanfranco; Wolseley); in places of high nutrient status (Haslam). *Gozo*: seems more rare than in *Malta* (S. & C.G.). *Comino*: (Borg).

Mediterranean region as far as Caucasus, central Europe, East Indies and St. Helena.

2. *Parietaria* L.

Annual or perennial herbs, sometimes woody at the base, without stinging hairs. Leaves alternate, entire; stipules absent. Flowers hermaphrodite or unisexual, in axillary, bracteate, 3- to many-flowered cymes, one or more in each leaf-axil. Perianth green, cylindrical and 4-toothed in female flowers, 4-partite in hermaphrodite and male flowers. Achenes enclosed in perianth and sometimes in the bracts.

1. Bracts equalling or exceeding the perianth in fruit; achenes brown or olive
Bracts shorter than the perianth in fruit; achenes black

3. *Iusitanica*
2.

2. Plant erect, usually more than 30 cm. high; leaves 3-12 cm. long; bracts completely free

1. *officinalis*

Plant procumbent or ascending, rarely more than 40 cm. high; leaves not more than 5 cm. long; bracts shortly connate at base

2. *judaica*

1. *P. officinalis* L.

Plate IV

Xeht ir-rih
Upright Pellitory-of-the-Wall

Perennial; stem 30-100 cm. high, erect, simple or slightly branched, densely pubescent. Leaves 3-12 cm. long, ovate-lanceolate or elliptical, long-acuminate; petiole shorter than lamina. Bracteoles free, shorter than perianth. Achenes black. Fl. 1-12.

Common in cultivated places, and on rocks and walls, rarer in uncultivated places. Malta, Gozo and Comino: very common everywhere (S. & C.G.; Borg).

Mediterranean region, central Europe and Asia as far as Tibet.

2. *P. judaica* L.

P. diffusa Mert. & Koch.

P. officinalis var. *judaica* (L.) Fiori

Xeht ir-rih
Pellitory-of-the-Wall

Like *P. officinalis*, but the stem not more than 40 cm. high, procumbent or ascending, much-branched; leaves up to 5 cm. long, ovate-acuminate; bracteoles shortly connate at base.

With *P. officinalis* and often replacing it in more open situations (Borg; G. Lanfranco).

S. & W. Europe, extending to Switzerland and W. Germany.

3. *P. lusitanica* L. subsp. *lusitanica* Mediterranean Pellitory-of-the-Wall

Slender, diffuse annual 5-30 cm. high. Leaves up to 4 cm. long, broadly ovate-orbicular. Bracteoles equalling or longer than perianth; perianth not more than 1.5 mm. long, the lobes incurved at the apex and connivent in fruit. Achenes brown or olive, the apex symmetrical. Fl. 4-5.

Shady places, on rocks. Malta: Very rare (G. Lanfranco) as at Wied il-Ghasel (Borg; Penza); Maqluba (Wolseley). Gozo: Xlendi (S. & C.G.; Borg); Mgarr ix-Xini (Borg).

Mediterranean region; subsp. *lusitanica* confined to the western half.

SANTALALES

XVII. SANTALACEAE

Herbaceous or woody plants. Leaves alternate, simple, linear, oblong or lanceolate, exstipulate, deciduous or evergreen. Flowers small, hermaphrodite or unisexual. Perianth 3- to 5-lobed or partite, tubular to campanulate-rotate. Stamens 3-5, opposite lobes of the perianth. Ovary inferior, 1-celled. Style 1; stigma capitate or lobed. Fruit a small green nut or a drupe. Seed solitary, with abundant endosperm. Hemiparasites, growing on the roots of herbs or shrubs.

1. *Thesium* L.

Perennials, rarely annuals, without a rhizome, but often with a woody stock and sometimes producing slender stolons; stems procumbent to erect, simple or branched. Leaves alternate, linear to lanceolate, mostly entire, 1- to 5-veined, green or yellowish-green. Inflorescence a panicle with few-flowered branches, or a raceme. Flowers small, hermaphrodite, on short branches, with a bract and usually with 2 bracteoles. Perianth tubular to campanulate-rotate, 4- to 5-lobed

usually white inside and yellowish-green or green outside. Stamens 4 or 5. Stigma capitate. Fruit a small green nut surmounted by the persistent dry perianth.

1. *T. humile* Vahl

Plate IV

Field Bastard-Toadflax

Annual. Stems 5-20 cm. high, ascending to erect, usually branched from the base with long simple branches. Leaves linear or narrowly linear, rather fleshy, denticulate, 1-veined. Inflorescence often subspicate, sometimes paniculate. Bract 2-5 times as long as flower or fruit; bracteoles usually equalling flower or fruit. Perianth infundibuliform, 5-lobed. Nut subglobose, reticulately veined, 5-6 times as long as the persistent perianth. Fl. 3-4.

Fields and uncultivated arid places. Malta: rather rare, St. Andrews, Delimara, Wied Incita (S. & C.G.; Borg); Kordin (GD.; Borg); Wardija (Gauci). Gozo: Xlendi, Qala (Duthie, S. & C.G.); Mgarr ix-Xini (Borg).

Mediterranean region; Portugal.

ARISTOLOCHIALES

XVIII. ARISTOLGCHIACEAE

Herbs or woody climbers. Leaves alternate, entire, exstipulate. Flowers solitary or in axillary clusters, hermaphrodite, actinomorphic or zygomorphic, usually 3-merous. Perianth in 1 whorl, more or less petaloid, forming a tube, 3-lobed at the apex or with a single unilateral lobe; stamens 6 or 12, in 1 or 2 whorls, free or connate with the styler column. Ovary inferior, 6-locular; placentation axillary; styles usually 6, free or connate to form a column with a 6-lobed stigma; ovules numerous. Fruit a capsule.

1. *Aristolochia* L.

Perennial herbs or woody climbers. Flowers axillary. Perianth zygomorphic, deciduous, the base swollen (utricle), the upper part narrower, more or less cylindrical (tube); limb unilateral and entire, rarely absent or 3-lobed. Stamens usually 6, in 1 whorl, connate with styler column. Fruit a septicidal capsule.

1. *A. longa* L.

Plate IV

Green-flowered Birthwort

Usually branched, glabrescent, 20-80 cm. high; tuber cylindrical. Leaves 2.6 (-9) cm. long, ovate-triangular; petioles up to 1 (-1.5) cm. long. Flowers 3-5 (-6) cm. long, brownish or yellowish-green, limb brownish-purple; pedicels about equalling petioles. Capsule 1.5-3 cm., globose to pyriform. Fl. 4-6.

Rocky places. Malta: very rare (G. Lanfranco); Wied Babu (S. & C.G.; Borg); Wied Ghomor (Reade; Borg); Wied Hrejjeff (Asphar, fide Gulia); Wied iz-Zurrieq, Wied id-Dis (Borg).

Mediterranean region, but rare in the east; Portugal.

BALANOPHORALES

XIX. BALANOPHORACEAE

Herbs without chlorophyll, parasitic on the roots of other plants. Flowers usually unisexual, in dense, spicate or capitate inflorescences. Fruit a small, 1-seeded nut; seed with abundant endosperm and minute embryo.

1. *Cynomorium* L.

Perennial. Male, female and hermaphrodite flowers present. Perianth of 1-5 linear to cuneate or oblanceolate segments, partly fused to the ovary in female and hermaphrodite flowers. Stamen 1, epigynous. Style and stigma 1.

1. *C. coccineum* L. Plate IV Gherq il-ġeneral, Gherq sinjur
Malta Fungus

Plant dark red to purplish-black. Stems 15-30 cm. high, erect, stout, fleshy, arising from a branched underground rhizome, bearing numerous triangular-lanceolate scale leaves. Inflorescence 6-12 x 2-4 cm., terminal, cylindrical-clavate, with a stout, fleshy axis on which there are numerous, dense, subcapitate cymes subtended by triangular-peltate, deciduous bracts. Fl. 4-5.

Near the sea, parasitic on roots of *Inula crithmoides* and *Halimione portulacoides*. Malta: Very rare (G. Lanfranco) as at Dingli Cliffs (S. & C.G.; Borg); Għallis (Penza). Gozo: Għbla tal-Aitar and Hagra tal-Ġeneral (GD).

Mediterranean region, Middle East, S. Portugal, Canary Islands; very local.

POLYGONALES

XX. POLYGONACEAE

Herbs, shrubs or climbers without latex. Leaves nearly always alternate; stipules often united in a membranous sheath (ochrea). Flowers hermaphrodite or unisexual; perianth 3- to 6-merous, herbaceous, often enlarging and becoming membranous in fruit. Stamens usually 6-9. Ovary superior, unilocular; styles 2-4; ovule solitary, basal. Fruit a trigonous or lenticular nut.

- | | |
|---|-----------------------|
| 1. Outer fruiting perianth-segments with 3 stout spines | 4. <i>Emex</i> |
| Outer fruiting perianth-segments not spiny | 2. |
| 2. Perianth segments 6, the inner much larger than the outer in fruit | 3. <i>Rumex</i> |
| Perianth segments 5, equal in fruit or the outer larger | 3. |
| 3. Outer perianth segments not winged or keeled in fruit | 1. <i>Polygonum</i> |
| Outer perianth segments winged or keeled in fruit | 2. <i>Bilderdykia</i> |

1. *Polygonum* L.

Herbs or dwarf shrubs. Leaves variously shaped, always distinctly longer than wide. Perianth-segments usually more or less equal, free or united at the base, petaloid at least in part, not winged or keeled. Stamens 8, rarely fewer. Stigmas 2 or 3. Nut lenticular or trigonous, not winged, enclosed in the persistent perianth or protruding from it for less than half its length.

- | | |
|---|----|
| 1. Ochreae white or silvery and hyaline, at least in distal part, eventually deeply lacerate; flowers in small, subsessile axillary clusters, or in lax, slender, often leafy spikes. | 2. |
| Ochreae brown, usually opaque, entire or fimbriate but scarcely lacerate; flowers usually in dense spikes, rarely in lax, leafless spikes. | 5. |

- | | |
|--|--------------------------|
| 2. Perennial; stems woody at base | 1. <i>maritimum</i> |
| Annual; stems scarcely woody at base | 3. |
| 3. Perianth-tube at least half as long as segments; leaves \pm uniform in size | 4. <i>arenastrum</i> |
| Perianth-tube very short; leaves on main stem much larger than those on branches | 4. |
| 4. Larger leaves 5-18 mm wide; perianth-segments wide, overlapping | 2. <i>aviculare</i> |
| Larger leaves 1-4 mm wide; perianth-segments narrow, not overlapping | 3. <i>rurivagum</i> |
| 5. Spikes lax and slender, with each flower distinctly visible | 5. <i>salicifolium</i> |
| Spikes dense and stout with the flowers crowded and overlapping | 6. |
| 6. Peduncles without glands | 6. <i>persicaria</i> |
| Peduncles bearing numerous subsessile yellow glands | 7. <i>lappathifolium</i> |

1. *P. maritimum* L.

Plate IV

Lewża tal-baħar
Sea Knotgrass

Perennial, with stout, woody stock. Stems 10-50 cm. high, procumbent, branched, stout. Leaves 5-25 mm. long, narrowly elliptical, acute, glaucous, usually blackening on drying; margins revolute. Ochreae reddish-brown at the base, with 8-12 conspicuous, branched veins, silvery-hyaline above, longer than most of the internodes. Flowers pink or whitish, solitary, or in axillary clusters of 2-4; bracts leaf-like. Nut 3.5-5 mm. long, equalling or slightly exceeding the perianth, glossy. $2n = 20$, Fl. 4-7.

In maritime areas. Malta: rare, Ġnejna, St. Georges (S. & C.G.; Borg); Mersa (GD.; Borg); Għadira is-Safra (Għallis). Salini, Buġibba, Pwales, Mellieħa, Marfa, Golden Bay (Borg). Gozo: rare, Ramla (S. & C.G.; Borg). Comino: Qala Sta. Marija (Borg).

European shores of Atlantic northwards to the Channel Islands; Mediterranean; Macaronesia.

2. *P. aviculare* L.

Lewża tar-raba
Knotgrass

Annual; stems erect or procumbent. Leaves 20-50 x 5-15 mm., lanceolate to ovate, subacute, those on the main stem much larger than those on the branches. Ochreae silvery-hyaline, with few, faint veins, usually less than half as long as the internodes; petioles very short, included in ochreae. Flowers solitary or in axillary clusters of 2-6; bracts leaf-like. Perianth-tube very short; segments greenish, 3.5 mm. long, included in perianth, punctulate, dull. $2n = 60$, Fl. 4-11.

Cultivated and uncultivated places, by paths etc., but it may be less common than *P. arenastrum*. Malta and Gozo: scattered (S. & C.G.; Borg).

Europe, Asia; introduced into N. America, Australasia, S. America.

3. *P. rurivagum* Jordan ex Boreau
P. bellardii All.

Narrow-leaved Knotgrass

Like *P. aviculare* but smaller; leaves linear or linear-lanceolate, acute or acuminate; those of the main stem 15-35 x 1-4 mm., those on the branches much smaller; ochreae longer (up to 1 cm.), brownish below; flowers few; perianth-segments narrow, scarcely overlapping; nut 2.5-3.5 mm., slightly exserted from perianth. $2n = 60$. Fl. 3-5.

In fields, among crops. *Malta*: Marsa (GD.; Borg); Ghajn Tuffieha, San Anton (Borg), but needs confirming.

Usually a weed in fields. Distribution uncertain; mainly in W. & S.C. Europe, but extending north-eastwards to Sweden.

4. *P. arenastrum* Boreau

Prostrate Knotgrass

Annual; stems usually less than 30 cm. long, procumbent, freely branched, forming a mat. Leaves 5-20 x 2.5-5 mm., elliptical or lanceolate, more or less uniform in size. Ochreae silvery-hyaline with few, faint veins, less than half as long as internodes. Flowers solitary or in few-flowered axillary clusters. Perianth tube at least half as long as segments. Nut 1.5-2.5 mm. long, included in perianth, dull, often with one side much narrower than the other two. $2n = 40$.

This may be the most common form of the *P. aviculare* aggregate in the Maltese Islands.

Probably throughout most of Europe, except the extreme north, but distribution imperfectly known; introduced into N. America.

(Plants which have been wrongly referred to *P. herniarioides* Delile somewhat resemble small *P. arenastrum*, but they are questionably annual. If perennial they may merit specific status as *P. gussonei* Tod. ex Cesati, Passer. & Gibelli (*P. aviculare* var. *depressum* Meissn.)).

5. *P. salicifolium* Brouss. ex Willd.
P. minus var. *serrulatum* (Lag.) Borg

Willow-leaved Knotgrass

Perennial, with rooting procumbent or decumbent branches. Stems 30-70 cm. high, ascending, rather stout. Ochreae strongly ciliate. Leaves 7-15 cm. long, linear-lanceolate, glabrous except for strong hairs on the margins and the veins beneath. Flowers pink, in long, lax, very slender spikes. Nut 2-2.5 mm. long, black, glossy, usually trigonous. Fl. 5-10.

Damp places and by springs. *Malta*: rare, Għnien il-Kbir, Mtahleb (S. & C.G.; Borg); Bahrija, Għnien Ingraw (Borg).

Wet places and river-banks in S. Europe.

6. *P. persicaria* L.

Persicaria

Annual; stems 20-80 cm. high, erect or ascending. Ochreae shortly ciliate. Leaves up to 15 x 3.5 cm., lanceolate, often with a large blackish spot, glabrous or occasionally tomentose beneath. Spikes cylindrical, dense, usually stout. Perianth bright or pale pink. Nut black, glossy, usually lenticular. $2n = 44$. Fl. 5-9.

Along streams. *Malta*: rare, Għnien il-Kbir, Mtahleb, Fiddien, Bahrija, Rdum il-Qawwi near Mellieha (S. & C.G.; Borg); Għnien Ingraw (Borg).

Ruderal, and weed in temperate regions of the northern hemisphere.

7. *P. lapathifolium* L.

Pale Persicaria

Annual; stems up to 80 cm. high, procumbent or erect, simple or branched, sometimes spotted with red. Ochreae entire or very shortly ciliate. Leaves ovate to linear-lanceolate, acute or obtuse, sometimes with a large blackish spot, glabrous or densely tomentose beneath, with pellucid, often yellow glands visible from lower surface. Spikes stout and usually dense; peduncles, and sometimes also pedicels and perianth, bearing yellow subsessile glands. Perianth dull pink or greenish-white. Nut black, glossy, usually lenticular. $2n = 22$. Fl. 5-10.

Malta: rare, Mellieha, Għnien Ingraw, Għnien Fleres, Burmarrad, Attard (Borg).

Temperate regions of the northern hemisphere; S. Africa.

P. equisetiforme Sibth & Sm. a woody perennial 50-120 cm. high has been recorded at Fort Manoel (G. & E. Lanfranco).

2. Bilderdykia Dumort.

Stem twining or procumbent; leaves deltate or cordate-sagittate, petiolate. Ochreae truncate. Flowers in lax, spike-like or paniculate terminal and lateral inflorescences. Perianth-segments 5(-6); the outer 3 larger, keeled or winged. Stamens 8. Stigmas capitate, subsessile. Nut triquetrous, not exceeding the perianth.

1. *B. convolvulus* (L.) Dumort.

Plate IV

Lebliha ħadra
Black Bindweed

Polygonum convolvulus L.

Puberulent or slightly mealy. Stem up to 1 m. long, angular, twining or spreading. Leaves 2-6 cm. long, acuminate. Flowers in narrow, spike-like inflorescences. Pedicels not more than 3 mm. long, even in fruit, articulated above the middle. Perianth-segments greenish-white, accrescent, the outer ones keeled or slightly winged in fruit (rarely with broad wings). Nut 4-5 mm., finely granular, dull black. $2n = 40$. Fl. 5-9.

Usually in gardens and irrigated land. *Malta*: uncommon, Hamrun, Attard, Lija, Balzan, Msida, Zabbar, Birzebbuga (Borg); Burmarrad (Borg; Gauci); San Pawl tat-Targa (Wolseley). Gozo: rare, Mgarr, Xlendi (Borg).

Cultivated ground and waste places. Europe (except the Arctic), N. Africa, temperate Asia; introduced in N. America and S. Africa.

3. *Rumex* L.

Herbs, rarely shrubs, usually with long, stout roots, sometimes rhizomatous. Leaves alternate; ochreae tubular. Flowers hermaphrodite or unisexual, arranged in whorls on simple or branched inflorescences, anemophilous. Perianth-segments in two whorls of 3, the outer remaining small and thin, the inner becoming enlarged and often hardened in fruit. Valves (fruiting inner perianth-segments) sometimes developing marginal teeth or dorsal tubercles as they mature. Stamens in two whorls of 3; anthers basifixed. Fruit a trigonous nut.

- | | | |
|---|---------------------------|----|
| 1. Shrub; leaves ovate-spathulate, often wider than long | 1. <i>lunaria</i> | |
| Herbs, sometimes woody at base; leaves usually longer than wide | | 2. |
| 2. Valves with distinct teeth more than 1 mm. long | 4. <i>bucephalophorus</i> | |
| Valves entire, or with very small or indistinct teeth | | 3. |

3. Pedicels slender, thin, articulated below the middle, deciduous, longer than the valves 2. conglomeratus

Pedicels thick, persistent, articulated near the middle but scarcely deciduous; about as long as the valves 3. pulcher

1. *R. lunaria* L.

Tree Sorrel

Shrub with flexuous branches. Leaves 2.5-5 x 2.5-6 cm., often wider than long, broadly ovate-spathulate, truncate at the base, rounded at the apex. Inflorescence a compound panicle. Outer perianth-segments 2 mm. long, lanceolate, deflexed. Valves 5 x 7 mm, long, reniform-ovate, narrowly cordate at base, rounded or truncate at apex, with a small, flat, quadrangular tubercle near the base; margin entire. Nut 3 x 1.3 mm., widest a little below the middle. Fl. 4-6.

Malta: cultivated for ornament and sometimes naturalised as at Buskett (Borg). Native of the Canary Islands; naturalized in Sicily and Sardinia.

2. *R. conglomeratus* Murray

Clustered Dock

Perennial 20-60 cm. high. Plant often papillose. Basal leaves small, fleshy, subtended by a leaf. Pedicels about as long as the valves, jointed near the middle. Valves 2.5-3.2 x 1-1.7 mm., oblong-ovate, entire, all tuberculate; tubercles often covering nearly the whole valve. $2n = 20$. Fl. 4-6.

Along streams. Malta and Gozo: common (S. & C.G.; Borg; G. Lanfranco; Wolseley). Comino: (Borg).

Riversides and waste places. Europe, from Scotland, S. Sweden and C. Russia southwards; Asia Minor; N. Africa; Azores; introduced in N. America.

3. *R. pulcher* L.

Fiddle Dock

Perennial 20-60 cm. high. Plant often papillose. Basal leaves small, fleshy, about twice as long as wide, cordate at base. Panicle open; branches flexuous, often entangled or arcuate; whorls all remote and subtended by a leaf. Pedicels thick, shorter than to as long as the valve, jointed near or slightly below the middle, scarcely deciduous. Valves thick, coarsely foveolate-rugose, very variable in size and outline. Fl. 4-6.

Two subspecies are recorded. Subsp. *pulcher* has the valves narrowly ovate or oblong with a ligulate apex; teeth oblong, few on each side near the base; one or two meshes of venation on each side of the tubercle; branches angular-flexuous, often intricate and leaves usually panduriform. It is apparently the most frequent subspecies. Subsp. *divaricatus* (L.) Murb. with the valves suborbicular or ovate-triangular, broadly acuminate at the apex; teeth short, up to 8 on each side; usually 3 meshes of venation on each side of the tubercles; branches arcuate-divaricate and leaves seldom panduriform has been recorded from Mtahleb and Gnejna (Borg).

Damp places, by paths etc. Malta: here and there, Mtahleb, Wied il-Qiegha, Ghajn Rihana, Gnejna etc. (S. & C.G.; Borg). Gozo: Mgarr ix-Xini (Borg).

Mainly ruderal. Western Europe from England southwards; Mediterranean region; Hungary, Balkans and Black Sea.

4. *R. bucephalophorus* L.

Plate V

Selq hamrani
Red Dock

Annual, or rarely perennial, with one or several slender stems; very variable in habit and size. Leaves very small. Flowers usually in clusters of 2 or 3. Pedicels usually dimorphic; some slender and very short, others long, broad and flat. Valves small, variable in size and shape. Fl. 12-5.

It is probable that all the plants of the Maltese Islands are referable to subsp. *bucephalophorus* (subsp. *gallicus* (Steinh.) Rech. fil.), though subsp. *graeus* (Steinh.) Rech. fil. occurs in Sicily. Subsp. *graeus* has the pedicels nearly all short and slender; the valves all similar, 3-3.5 (-4) mm. long, with 3 (-4) broad-based teeth on each side and the nut c. 2 mm. long, while subsp. *bucephalophorus* has the pedicels dimorphic, some short and slender, some long, broad and flat, and valves usually of two kinds, but all with narrow-based teeth.

Uncultivated and cultivated places. Malta, Gozo, and Comino: very common everywhere (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Sandy and rocky places, usually near the sea. Mediterranean region. Canary Islands and Azores.

4. *Emex* Campd.

Annual herbs; monoecious. Ochreae not ciliate, soon laccrate. Female flowers at base of inflorescence; perianth-segments 6, free in male flowers, connate in female flowers, the outer 3 spinescent and indurated in fruit. Stamens 4-6. Stigmas 3. Nut triquetrous, included in perianth.

1. *E. spinosa* (L.) Campd.

Plate V

Selq xewwiki
Spiny Dock

Glabrous, stems 30 cm. high or more, erect or ascending. Leaves ovate, truncate or subcordate at base, petiolate. Male flowers in terminal and axillary pedunculate clusters; female axillary, sessile. Fruit enclosed in perianth; outer segments ending in patent spines; inner erect, tubercled. Fl. 1-5.

Open places, both cultivated and uncultivated. Malta: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley). Gozo: more rare (S. & C.G.). Comino: (S. & C.G.).

Sandy shores and disturbed ground. Mediterranean region, extending to N. W. Spain and Azores.

CENTROSPERMAE

XXI. CHENOPODIACEAE

Herbs, shrubs or rarely small trees, often succulent; glabrous, pubescent or farinose with vesicular hairs. Leaves alternate or opposite, exstipulate. Flowers hermaphrodite or unisexual, often bracteolate, solitary or in dense cymose clusters in a spicate or paniculate inflorescence. Perianth absent or 1- to 5-merous, often accrescent in fruit; segments usually more or less connate. Stamens 1-5, opposite the perianth-segments. Ovary superior, rarely semiinferior, unilocular; ovules solitary, basal; stigmas (1-) 2-3 (-5). Fruit usually an achene. Seeds

horizontal (compressed in the vertical plane) or vertical (compressed in the horizontal plane).

1. Leaves flat, the largest usually at least 5 mm. wide, frequently toothed, lobed or pinnatifid.
- Leaves filiform, semi-cylindrical, scale-like or apparently absent
2. Flowers all unisexual; female flowers mostly without perianth, but with 2 bracteoles which become enlarged and enclose the fruit
- Flowers mostly hermaphrodite, rarely all unisexual and the female with 3 or more perianth-segments
3. Bracteoles free, at least in the upper half
- Bracteoles connate almost to the apex
4. Perianth-segments in fruit with a tubercle, or horizontal wing or keel on the back
- Perianth segments in fruit without a tubercle or horizontal wing or keel
5. Perianth segments conspicuously thickened at the base in fruit and adhering in groups of 2-4
- Perianth segments neither conspicuously thickened at the base in fruit nor adhering in groups of 2-4
6. Stems not segmented; leaves obvious, sometimes small, but then alternate
- Stems segmented; leaves opposite, rudimentary
7. Bracteoles minute
- Bracteoles conspicuous
8. Annuals; all branches terminated by an inflorescence
- Perennials; with many non-flowering branches
9. Opposite pairs of bracts free, reniform-obovate
- Opposite pairs of bracts connate to form a segment

1. Beta L.

Glabrous herbs. Leaves flat, more or less entire. Flowers hermaphrodite, solitary or in few-flowered cymes arranged in a spicate inflorescence. Perianth-segments and stamens 5; ovary semi-inferior, connate with the receptacle in fruit; stigmas usually 2-3. Fruits often adhering together by the swollen perianth and receptacle. Seeds horizontal.

1. *B. vulgaris* L.

Plate V

Selq salvagg
Sea Beet

Annual to perennial up to 200 cm. high. Basal leaves ovate-cordate to rhombic-cuneate; cauline rhombic to lanceolate. Inflorescence dense, becoming

interrupted towards the base in fruit, ebracteate, at least in the upper half. Receptacle pelviform; segments not more than 3 mm. long in fruit, incurved. Stigmas usually 2. $2n = 18$. Fl. 3-7.

The native plant has the stem up to 80 cm. high, procumbent to erect, root usually not swollen, leaves up to 10 cm. long and cymes 1- to 3-flowered, and is referable to subsp. *maritima* (L.) Arcangeli (var. *perennis* L.). Subsp. *vulgaris* (var. *cycla* L.; var. *esculenta* Salisb.) with stems up to 200 cm. high, erect, root swollen, leaves up to 20 cm. long and cymes 2- to 8-flowered was cultivated according to Borg, but is not mentioned by Bowen-Jones et al. (1961). Its origin is unknown.

Uncultivated places, especially near the sea. Malta, Gozo and Comino: common (S. & C.G.; Borg; Wolseley).

Subsp. *maritima* occurs on the coasts of S. & W. Europe northwards to c. 59°N in W. Sweden; Azores, N. Africa, and Asia Minor to the East Indies. Subsp. *vulgaris* is widely cultivated.

2. Chenopodium L.

Annual, rarely perennial herbs, glabrous, pubescent, glandular or farinose. Leaves alternate, flat. Flowers hermaphrodite and female, usually in cymes, variously arranged. Bracteoles absent. Perianth segments 2-5, more or less unaltered in fruit, rarely becoming fleshy; stamens 1-5; stigmas 2 (-5). Seeds usually horizontal.

1. Plant pubescent, with yellow or amber-coloured glands or glandular hairs, aromatic, not farinose
- Plant glabrous or farinose, eglandular, not aromatic
2. Inflorescence axes and outside of sepals glabrous (rarely sparsely farinose)
- Inflorescence-axes and outside of sepals \pm conspicuously farinose, at least when young
3. Plant smelling strongly of decaying fish; leaves entire or with a single angle on one or both sides towards the base
- Plant not smelling of decaying fish; leaves often more or less dentate or lobed
4. Seeds with acute margins; testa with minute, very close, rounded pits; leaves often strongly dentate, not at all 3-lobed
- Seeds with obtuse margins; testa smooth, furrowed or with much larger pits; leaves variable
5. Leaves (at least the middle and lower cauline) almost or quite as wide as long; inflorescence very grey-farinose
- Leaves (except the most juvenile) at least one and a half times as long as wide; inflorescence usually not very grey-farinose
6. Plant usually deep green (though often more or less marked by grey); stems often reddish; leaves usually ovate-lanceolate, dentate or entire; testa with shallow widely spaced radial furrows

Plant usually rather bright glaucescent green; stems not red; larger cauline leaves always ovate-rhombic, with acute forwardly directed teeth; testa with more numerous closer and deeper furrows 7. *suecicum*

1. *C. ambrosioides* L.

Ghobbejra tfuh të fa
Mexican Tea

Annual, rarely short-lived perennial, up to 1.2 m. high, strongly aromatic pubescent (rarely with longer hairs) with many sessile glands. Leaves usually lanceolate, entire, dentate or rarely laciniate. Inflorescence paniculate; cyme sessile along the ultimate branches, usually bracteate. Calyx not saccate or net veined; sepals free to at least half-way down, rounded on back. Seeds 0.5-0.8 mm. in diameter. $2n = 32$. Fl. 4-11.

Uncultivated places, along paths etc. *Malta*: formerly rare at Marsa (S. & C.G. Borg); Wied il-Kbir (Borg); Pietà (Haslam); now widespread in the centre of the island (Gauci). *Gozo*: rare, Xlendi (S. & C.G.); frequent Wied il-Lunzjata and Xlendi (Borg).

Cultivated as a vermifuge and naturalized in many parts of the world. Native of N. and Tropical America.

2. *C. vulvaria* L.

Ghobbejra tinten
Stinking Goosefoot

Annual (4-) 10-65 cm. high, procumbent, much-branched, grey-farinose, smelling of decaying fish. Leaves up to 2.5 (-3) x 2.3 (-2.7) cm. long, rhombic to ovate, entire or with an acute angle on each margin at the broadest part, more or less densely grey-farinose beneath. Inflorescences terminal and axillary, small, leafy. Sepals 5, not keeled. Seeds 1-1.5 mm. in diameter, brownish-black, obtusely keeled. $2n = 18$. Fl. 4-11.

Cultivated places and along roads. *Malta*: common (Borg), particularly in the N.E. (Wolseley). *Gozo*: less common (Borg).

Most of Europe; N. Africa; S. W. Asia; introduced in N. America.

3. *C. urbicum* L.

Ghobbejra
Upright Goosefoot

Annual (4-) 15-100 cm. high, erect, glabrous or very sparingly farinose. Lower leaves up to 14 x 11 cm., deltate to ovate, attenuate to the petiole; margins shallowly dentate to coarsely dentate-lobate, above the basal lobes. Panicles with crowded, suberect branches. Sepals 5, not keeled. Seeds 0.9-1.3 mm. in diameter, horizontal, black, obtusely keeled. $2n = 36$. Fl. 6-11.

Ruderal and on dung heaps. *Malta*: Wied Babu (GD.; Borg); Valletta glacis (Borg).

Most of Europe; S.W. & C. Asia; introduced in N. America.

4. *C. murale* L.

Ghobbejra hadra
Nettle-leaved Goosefoot

Annual up to 90 cm. high, erect or spreading, usually much-branched, more or less farinose. Leaves usually rhombic-ovate and coarsely dentate, not 3-lobed. Inflorescences terminal and axillary, divaricately branched, leafy. Sepals 5,

sharply keeled above. Seeds 1.2-1.5 mm. in diameter, black, horizontal, acutely margined; pericarp adherent; testa closely and minutely pitted. $2n = 18$. Fl. 3-11.

Ruderal, and along paths. *Malta*, *Gozo* and *Comino*: common (S. & C.G.; Borg; Wolseley).

Most of Europe; N. & S. Africa; S.W. & S. Asia; introduced in America and Australia.

5. *C. opulifolium* Schrader ex Koch

Ghobbejra griża
Grey Goosefoot

Annual 60-150 cm. high, erect, much-branched, green to almost white, rarely red-tinged, more or less grey-farinose. Leaves (at least the middle and lower) rhombic-ovate, almost as wide as long, usually with a short, prominent lobe on each side, otherwise entire or with several teeth. Inflorescence a very grey-farinose panicle. Sepals 5, keeled. Seeds 1.1-1.5 mm. in diameter, black, obtusely keeled; testa not pitted. $2n = 54$. Fl. 5-9.

In cultivated places. *Malta*: common (S. & C.G.; Borg; Wolseley).

Most of Europe, but only as a casual in the north; N., E. tropical and S. Africa; Asia Minor; C. Asia; introduced in N. America.

6. *C. album* L.

Plate V

Ghobbejra bajdaniġa
Fat Hen

Annual 10-150 cm. high, usually erect, green or red-tinged (especially on the stem), more or less grey-farinose. Leaves 1.2-8.2 x 0.3-5.5 cm., very variable, rhombic-ovate to lanceolate, mostly at least one and a half times as long as wide, entire, or shallowly dentate, sometimes more or less 3-lobed. Inflorescence a spicate or cymosely branched panicle. Sepals 5, keeled outside. Seeds 1.2-1.6 (-1.85) mm. in diameter, black, obtusely margined, usually marked with faint radial furrows, otherwise almost smooth. Fl. 6-10.

In cultivated places. *Malta* and *Gozo*: very common (GD; Gullia; Borg; Wolseley).

Most of Europe; N. & S. Africa; Asia; America, Australia.

7. *C. suecicum* J. Murr
C. viride auct., non L.

Broad-leaved Fat Hen

Annual 10-150 cm. high, usually a rather bright glaucescent green, somewhat farinose when young. Cauline leaves ovate-rhombic, with sharp ascending teeth. Inflorescence a rather lax cyme. Sepals 5, keeled outside. Seeds 1.2-1.6 (-1.85) mm. in diameter, black, obtusely margined, with numerous, close, well-marked furrows. $2n = 18$.

In cultivated places. *Malta*: Wied Gerżuma, Attard and Gnien il-Kbir (Borg).

N., C. & E. Europe, and Asia; occasionally naturalized elsewhere.

According to Borg, *C. giganteum* D. Don (*C. album* var. *amaranticolor* Coste & Reyn.) which differs from *C. suecicum* J. Murr in being 200-300 cm. high, with the young parts of the plant being conspicuously tinged with reddish-purple, and with large rhombic-deltate leaves up to c. 14 cm. long and wide, was cultivated as a pot herb and used as Spinach, and became naturalised in many gardens. *Spinacea oleracea* L., Spinach is widely grown as a vegetable.

3. *Atriplex* L.

Annuals or small shrubs; glabrous or farinose. Leaves flat. Flowers usually unisexual. Male flowers with 5 perianth-segments and 5 stamens. Female flowers without perianth but with 2 large persistent bracteoles, free or connate up to the middle; rarely some female flowers with 4- to 5-lobed perianth; stigmas 2. Seeds vertical, often dimorphic, rarely some horizontal.

1. Shrubby perennials

Annuals

2. Leaves ovate-rhombic or deltate

Leaves lanceolate

3. Bracteoles becoming hard in fruit; stems terete or angled

Bracteoles not becoming hard; stems strongly ridged

4. Cymes axillary, except the uppermost

Cymes in terminal, leafless, often long panicles

5. Lower leaves cuneate at base

Lower leaves truncate at base

1. *A. halimus* L.

Maxixa mielha, Bjanka
Shrubby Orache

Erect stout shrubby perennial up to 250 cm. high, silvery-white. Leaves up to 4 cm. long, ovate-rhombic or deltate, almost coriaceous, entire or rarely dentate. Cymes remote, in a paniculate inflorescence. Bracteoles orbicular-ovate to orbicular or reniform, entire or dentate, usually without appendages on the back. $2n = 18$. Fl. 8-11.

Var. *gussoneanum* Gulia with dense cymes and the bracteoles in fruit somewhat triangular was recorded by Borg from Malta: Birzebbuga and Gozo: Marsalforn.

Near the sea. Malta: formerly rare, on the bastions and in the ditches of Valletta, Birzebbuga, Marsascalea (S. & C.G.); Mellieha Bay (Wolseley; Gauci); now widely planted (Gauci). Gozo: Wied Xlendi (S. & C.G.).

Mediterranean region; western France; S. Africa; N. & S. America.

2. *A. mollis* Desf.

Silvery Orache

Shrub up to 50 cm. high, much-branched from the base. Leaves 10-20 x 4 mm., lanceolate, silvery. Inflorescence paniculate, lax, shortly branched. Bracteoles thin, orbicular.

Very rare or accidental and now probably extinct. Malta: Xemxija near St. Paul's Bay (Borg).

N. Africa and Canary Islands.

3. *A. rosea* L.

Rosy Orache

Erect or ascending annual up to 100 cm. high, much-branched, stems smooth or angled. Leaves up to 6 x 3 cm., ovate-rhombic or rhombic-triangular, sinuate-dentate, white. Cymes axillary, except the uppermost. Bracteoles up to 12 mm. long, rhombic, dentate, becoming hard in the lower half, usually with large appendages on the back. Fl. 6-11.

Sandy places by the sea. Malta: rare, St. Paul's Bay, Ta' Xbiex (S. & C.; Borg).

Ruderal. S. & C. Europe.

4. *A. tatarica* L.

Tartary Orache

Procumbent to erect, much-branched whitish annual up to 150 cm. high; stem smooth or angled. Leaves up to 10 x 7 cm., silvery, triangular-rhombic to triangular-hastate, irregularly sinuate-lobed, the lowest lobe largest. Inflorescence terminal, paniculate or spicate. Bracteoles up to 7 mm. long, orbicular to oblong-rhombic, reticulate-veined, becoming hard in the lower half, with or without appendages on the back. $2n = 18$. Fl. 6-11.

Malta: recorded by Gulia from Marsaskala.

C. & S. Europe.

5. *A. patula* L.

Common Orache

Much-branched annual up to 150 cm. high, slightly farinose; stem strongly ridged. Lower leaves 3-14 x 1-6 cm., rhombic-hastate with cuneate base, the upper lanceolate to linear, entire. Cymes axillary or in long spicate inflorescences. Bracteoles 5 (-10) mm. long, broadly rhombic, entire or denticulate, smooth or tuberculate on the back. $2n = 36$. Fl. 6-11.

By paths and in uncultivated places near the sea. Malta: St. George's Bay near Birzebbuga, Marsa (Borg). Gozo: Xlendi, near Chambray (Borg).

Throughout Europe north to c. 71° N.; N. Africa; W. Asia; naturalized in N. America.

6. *A. hastata* L.

Plate V

Selq il-baħar

A. latifolia Wahlenb.

Spear-leaved Orache

Erect or procumbent, stems up to 100 cm. high, usually green, strongly ridged. Lower leaves up to 10 x 7 cm., hastate, the base subcordate. Inflorescence paniculate or spicate. Bracteoles not more than 5 mm. long, triangular-rhombic to elliptic-rhombic, dentate. Seeds nearly all small. $2n = 18$. Fl. 6-11.

By paths and in uncultivated places near the sea. Malta: local (G. Lanfranco) as at Ta' Xbiex, St. George's Bay, Marsaskala (S. & C.G.; Borg); Pwales, Marfa, Wied Dalam etc. (Borg); Marsa (S. & C.G.; Borg; Wolseley); Għadira, Pietà (Gauci). Gozo: Wied Xlendi (S. & C.G.; Borg); Marsalforn (Wolseley).

Ruderal, usually near the coast. Throughout Europe northwards to c. 71° N. in Norway; N. Africa; Asia.

4. Halimione Aellen

Like *Atriplex* but the bracteoles connate almost to the apex in fruit.

1. *H. portulacoides* (L.) Aellen Plate VI
Atriplex portulacoides L.; *Obione portulacoides* (L.) Moq. Sea-purslane

Small decumbent shrub 20-80 (-150) cm. high, silvery-farinos, stems rooting. Lower leaves opposite, oblong, elliptical or obovate, entire, thick and fleshy. Fruit sessile. Bracteoles 2.5-5 mm. long, obdeltate, usually 3-lobed at apex. $2n = 36$. Fl. 7-12.

Rare on rocks and sand near the sea. *Malta*: Mtaħleb, Dingli, Rdum il-Qaww (Borg). *Gozo*: Dwejra, Hagret il-General (Borg).

Salt-marshes, particularly at the edges of channels and pools; shores of the Mediterranean, Atlantic and North Sea, northwards to Denmark; S.W. shores of the Black Sea; N. Africa; Asia Minor; S. Africa; introduced in N. America.

5. Kochia Roth

Pubescent herbs. Leaves linear, flat or cylindrical, entire. Flowers hermaphrodite or female, solitary or in cymes arranged in a panicle. Perianth segments becoming enlarged in fruit and developing a transverse wing or tubercle on the back in fruit; stamens 5; stigmas 2-3. Seeds horizontal.

1. *K. scoparia* (L.) Schrader Plate VI Summer Cypress

Erect annual 20-150 cm. high. Leaves up to 50 mm. long, flat, lanceolate or linear-lanceolate, 3-veined. Fruiting perianth 3-4 mm. long, pubescent, with ovate-obtuse segments; wing very short or reduced to a tubercle.

Malta: widely cultivated (Wolseley), for its ornamental foliage and often naturalized, San Anton, Rabat, Marfa, ditches of Valletta and Floriana, Manoel Island etc. (Borg).

Cultivated for its ornamental foliage in C., E. & S. Europe; native of Temperate Asia.

6. Halocnemum Bieb.

Small fleshy shrubs with opposite and decussate leaves. Flowers hermaphrodite in 2- to 3-flowered axillary cymes arranged in a spicate, articulate inflorescence. Perianth-segments 3; stamen 1; stigmas 2-3.

1. *H. strobilaceum* (Pallas) Bieb. Plate VI Claspingleaved Sea Purslane

Stem up to 50 cm. high, becoming woody. Leaves connate at the base and enclosing the stem so that it is apparently articulate; free part of leaves c. 1 mm. long, broadly obovate, obtuse; leaves subtending short globose branches. Bracts free, reniform-orbicular; cymes globose to cylindrical-globose. Seeds 0.5-0.8 mm. Fl. 10-11.

Rare in saline places, not recently recorded. *Malta*: St. Julians etc. (GD.); Marsascala (Gulia).

Shores of the Mediterranean, Black and Caspian Seas; C. Asia; Arabia.

7. Arthrocnemum Moq.

Small articulate, glabrous shrubs. Leaves opposite, scale-like, the bases of each leaf amplexicaul; fused to form a segment. Inflorescence spicate, segmented; each segment composed of two 3-flowered cymes immersed in the pair of bracts arising from the node above; the flowers of each cyme more or less equal in size, the central distinctly separating the laterals. Perianth-segments usually 4; stamens 2.

Flowers of each cyme falling to leave a tripartite hollow in the segment; seeds greenish-brown to greyish; testa thin, membranous, covered with short conical or curved hairs

1. fruticosum

Flowers of each cyme falling to leave an undivided hollow in the segment; seeds black; testa hard, tuberculate

2. glaucum

1. *A. fruticosum* (L.) Moq.

Almeridja

Salicornia fruticosa (L.) L.

Shrubby Glasswort

Small shrub, with creeping subterranean stem forming mats up to 1 m. in diameter. Aerial stems erect or procumbent, usually stout and not rooting, glaucous; cymes clearly not reaching the upper edge of the fertile segment; testa covered with short conical hairs. $2n = 54$. Fl. 8-11.

In saline places liable to flooding and on maritime rocks. *Malta*: rare (G. L. Franco) as at Marsa, Marsascala, Marsaxlokk (S. & C.G.; Borg); St. Julians, Sliema (GD.; Borg); St. Paul's Bay, Bahar i-Cagħaq (Borg).

Coasts of S. Europe extending northwards to 47° 15' N. in W. France; N. & S. Africa; Asia Minor; Arabia; America.

2. *A. glaucum* (Delile) Ung.-Sternb.

Plate VI

Almeridja

Salicornia macrostachya Moric.

Glaucous Glasswort

More or less erect shrub up to 1 m. high, glaucous, becoming yellowish-green or reddish. Cyme protruding, free, falling to leave one hollow in the segment; flowers extending to more than a third of the length of the segment. Seeds black; testa hard, tuberculate; endosperm abundant. $2n = 36$. Fl. 7-11.

In saline places liable to flooding and on maritime rocks. *Malta*: rare (G. L. Franco), as at Salini, Marsascala, Marsaxlokk (S. & C.G.; Borg); Sliema, St. Julians etc. (GD.; Borg); Wied Moqbel, Ghallis etc. (Gulia). *Gozo*: Dwejra (S. & C.G.; Borg). *Comino*: Santa Marija, San Niclaw (S. & C.G.; Borg).

Coasts of Mediterranean region, Arabia, Canaries, Cape Verde Islands.

8. Salicornia L.

Annual, articulate herbs. Leaves and inflorescence like those of *Arthrocnemum*. Cymes (1-) 3-flowered, connate with and completely immersed in the bract of the segment, the flowers arranged in a triangle, the laterals usually meeting below the central flower. Perianth 3- to 4-lobed; stamens 1-2. Seeds with thin membranous testa; endosperm very sparse.

1. *S. ramosissima* J. Woods
S. herbacea auct.

Plate VI

Almeridja
Twiggy Glasswort

Erect or procumbent up to 40 cm. high, typically much branched but sometimes forming pure stands of small simple plants; dark green, sometimes becoming yellowish-green, with dark purplish-red first appearing round the flowers and along the upper edge of the fertile segments and sometimes eventually colouring the whole segment. Terminal spike 5-30 (-40) mm., lower fertile segments 1.9-3.5 mm. long, 2.5-4 mm. wide at the narrowest point and 3-5.3 mm. wide at the widest; upper edge with a conspicuous, scarious margin 0.1-0.2 mm. wide. $2n = 18$. Fl. 6-10.

In places liable to saline flooding. *Malta*: locally frequent (G. Lanfranco; Wolseley) as at Marsaxlokk, Marsaskala, Mellieha (S. & C.G.; Borg); Sliema (GD.; Borg); St. Paul's Bay (Cleghorn; Borg); Qawra, Selmun, Marfa, St. George's Bay (Borg); Salina, Marfa peninsula (Wolseley); St. Andrews (Haslam). *Gozo*: Qbajjar, Ramla, Xlendi (Borg). *Filfa*: (Gulia, Borg).

N.W. Europe and W. Mediterranean region.

9. *Suaeda* Forskal ex Scop.

Annual or perennial herbs or small shrubs, glabrous or farinose. Leaves usually alternate, semicylindrical or flat. Flowers hermaphrodite and female, solitary or in few-flowered cymes; bracteoles 2, minute. Perianth-segments 5, fleshy, sometimes with a small tubercle, or horns, or a narrow transverse wing on the back in fruit; stamens 5; stigmas 2-3 (-5). Seeds vertical or horizontal.

Small shrub; seeds smooth, usually vertical
Annual; seeds reticulate, usually horizontal

1. *vera*
2. *maritima*

1. *S. vera* J.F. Gmelin

Plate VI

Swejda, Ghobbejra tar-rmied
Shrubby Seablite

S. fruticosa auct.

Small shrub up to 120 cm. high. Leaves 5-18 (0.8-) 1-1.5 mm., semicylindrical, obtuse or shortly apiculate, sessile, glaucous. Cymes dense, shorter than the bracts. Stigmas usually flat, oblong-ovate, lobed or capitate. Fruiting perianth usually green, not inflated. Seeds smooth, usually vertical. Fl. 6-10.

Marine rocks, but also on old walls far from the sea. *Malta*: locally frequent (G. Lanfranco; Wolseley) as at Mtahleb, Marsaxlokk, Marsa (S. & C.G.; Borg); Marfa, Gnejna, Bahrija (Borg). *Gozo*: Dwejra, Wied Bingemma, Xlendi, between Rabat and Marsalforn (S. & C.G.; Borg); Nadur, Xaghra (Borg).

S. & W. Europe northwards to c. 53° N. in England; Madeira; Canaries; St. Helena, Angola.

2. *S. maritima* (L.) Dumort.

Swejda, Ghobbejra tar-rmied
Common Seablite

Annual up to 50 (-100) cm. high of very variable habit and colour. Leaves 10-50 x c. 1 mm., semicylindrical, acute or subobtuse. Cymes dense. Fruiting perianth not inflated, green or red. Seeds finely reticulate, usually horizontal. $2n = 36$. Fl. 6-10.

Saline places near the sea. *Malta*: not common, Marsaxlokk, Marsaskala, Ta' Xbiex (S. & C.G.; Borg); Marsa etc. (GD.; Borg); Gnejna, Bahrija, Marfa (Borg); Bahar it-Caghaq, Salini (Wolseley).

In suitable habitats throughout most of Europe except the north-east and extreme north; Russia; E. Asia, East Indies; N. America.

10. *Salsola* L.

Annuals or dwarf shrubs; glabrous or pubescent. Leaves filiform or semicylindrical, alternate or opposite. Flowers hermaphrodite, with 2 conspicuous bracteoles. Perianth-segments 5 (3 outer and 2 inner), usually developing a transverse wing on the back in fruit; stamens 5; stigmas 2 (-3). Seeds usually horizontal.

- | | |
|---|-----------------------|
| 1. Shrub | 3. <i>vermiculata</i> |
| Annual herbs | 2. |
| 2. Perianth tubular in fruit; lower leaves mostly opposite | 1. <i>soda</i> |
| Perianth pelviform in fruit; lower leaves alternate or at most 1-3 pairs opposite | 2. <i>kali</i> |

1. *S. soda* L.

Plate VI

Haxixa tar-rmied
Opposite-leaved Saltwort

Erect glabrous annual up to 70 cm. high. Leaves 20-70 mm. long, semi-cylindrical, ovate at base, with long-linear, mucronulate apex; the lower opposite. Upper bracts equalling the flowers; bracteoles ovate, with short acumens. Perianth-segments ovate, becoming hardened in fruit, the margin pectinate-ciliate, transversely keeled or with a small wing (c. 1 mm. wide) on the back. Stigma longer than styles. Seeds 3-4 mm., vertical, oblique or horizontal. Fl. 7-10.

By the sea in sandy or marshy places. *Malta* and *Gozo*: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region; E. C. Europe; C. Asia as far as Japan.

2. *S. kali* L. subsp. *tragus* (L.) Nyman
S. tragus L.

Haxixa tar-rmied
Saltwort

Erect or diffuse, yellowish, glabrous annual up to 100 cm. high. Leaves 10-40 mm. long, linear-subulate, acuminate. Bracts patent; bracteoles ovate-triangular, with long spine-like apex, swollen and more or less connate at base, longer than the flowers. Perianth-segments ovate, acuminate, soft, with an obscure midvein, not winged. Stigmas longer than style. Fl. 7-10.

By the sea. *Malta* and *Gozo*: more frequent than *S. soda* (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Coasts of Europe, Azores, N. Africa, Asia, N. America; subsp. *tragus* restricted to the Mediterranean region.

3. *S. vermiculata* L.

Shrubby Saltwort

Pubescent, virgate shrub up to 100 cm. high. Leaves 5-10 x 0.5-1 mm., semicylindrical to filiform, expanding into an ovate base, semi-amplexicaul, obtuse, usually pubescent. Primary branches of the inflorescence up to 20-40 cm. long, with regularly arranged secondary branches. Bracts ovate with a filiform apex;

bracteoles ovate, keeled, fimbriate, shorter than the perianth. Perianth 6-12 mm in diameter in fruit, the segments oblong-ovate, acute, sparsely pubescent; style obovate, finely veined. Stigmas shorter than the style, subulate, long-papillate. Fl. 8-9.

Rocks by the sea. *Malta*: rare, Marsaxlokk and below Dingli (S. & C.G.; Borg). Birzebbuga, Bahrija (Borg).

W. Mediterranean region and S. Portugal.

XXII. AMARANTHACEAE

Herbs or rarely small shrubs. Leaves opposite or alternate, entire, exstipulate. Flowers usually hermaphrodite, often in spicate or capitate, usually bracteate inflorescences; bracteoles 2-5. Perianth almost always dry and scarious, usually 5-merous; segments free or connate at base. Stamens 1-5, opposite the perianth segments and usually not exerted. Ovary superior, unilocular; ovules amphitropous. Fruit with a membranous, rarely fleshy, wall, dehiscing irregularly, or circumscissile.

1. *Amaranthus* L.

Annual, rarely perennial herbs; monoecious or dioecious. Leaves usually alternate. Bracteoles 3-5, small and herbaceous or membranous and spinescent. Perianth segments 0-5, linear or lanceolate to spatulate. Styles and stigmas 2-3. Fruit dry, membranous, indehiscent or dehiscing transversely. Seeds vertically compressed.

1. Perianth segments (4-) 5
- Perianth segments (2-) 3

2. Fruit inflated, not dehiscing transversely
- Fruit not inflated, dehiscing transversely
3. Bracteoles twice as long as the perianth, spinescent
- Bracteoles not longer than the perianth, not spinescent

1. *A. retroflexus* L.

Stems 15-100 cm. high, erect, lanate in the upper part. Leaves rhombic-ovate. Inflorescences spicate, usually short and dense. Bracteoles 3-6 mm. long, stout and spinescent, one and one third to two times as long as the perianth. Perianth segments 2-3 mm. long, linear-cuneate, truncate or obtuse, with a short mucro. Fruit dehiscing transversely, feebly muricate. Fl. 4-11.

On irrigated fields. *Malta*: not common as at Gfien il-Kbir, Pwales, Wied Gerżuma (S. & C.G.; Borg); Bahrija (Borg); Wied il-Lunzjata, Attard (Penza).

Introduced and naturalized throughout most of Europe; native of N. America.

2. *A. albus* L.

Stems 10-50 cm. high, erect or procumbent, much-branched, glabrous or sparsely puberulent. Leaves oblong or spatulate, cuneate, obtuse and slightly emarginate, mucronate; margin undulate. Inflorescence of short axillary cymose clusters. Bracteoles twice as long as the perianth, ensiform with long spinescent apex. Perianth-segments 3, narrowly elliptic. Fruit c. 1.5 mm., scarcely muricate, dehiscing transversely. Fl. 6-10.

Deab id-dib abjad
White Amaranth

Cultivated ground near the sea. *Malta*: rather rare (G. Lanfranco) as at Marsa, Mafleb, Wied Gerżuma, Bahrija (Borg); Attard (Penza).

Naturalized or a casual in most of Europe; native of N. America.

3. *A. graecizans* L.

Ghobbejra hamra

A. angustifolius Lam.; *A. sylvestris* Vill.

Southern Amaranth

Stems up to 70 cm. high, usually erect, usually glabrous. Leaves 2-4 x 1-2 cm., ovate or elliptic-rhombic, usually acute. Inflorescence of axillary cymose clusters. Bracteoles three fifths to three quarters as long as perianth, ovate, mucronulate. Perianth-segments 3, 1.3-2 mm. long, ovate-lanceolate, acute. Fruit longer than the perianth, somewhat muricate, dehiscing transversely, with green longitudinal veins when young. Fl. 6-10.

In cultivated places, and along garden paths. *Malta*: common (S. & C.G.; Borg). *Gozo*: common, especially in fields and gardens around Rabat (Borg).

S. Europe, introduced throughout most of Europe and sometimes naturalized.

4. *A. deflexus* L.

Plate VI

Ghobbejra, Denb id-dib lixx

Large-fruited Amaranth

Procumbent perennial up to 40 cm. high, densely puberulent in the upper part. Leaves 3-5 cm. long, rhombic-ovate, obtuse; margin finely undulate. Inflorescence usually dense, terminal, spicate, becoming interrupted and leafy towards the base. Bracteoles a third to half as long as the perianth, ovate, wide at the base, mucronate. Perianth-segments 2-3, 1.2-1.5 mm. long, linear to oblong-spathulate. Fruit 2.5-3 mm. long, oblong-ovate, inflated-membranous, smooth, with 3 dull green longitudinal veins, not dehiscing transversely. Seeds much smaller than the fruit. Fl. 5-10. In cultivated places. *Malta*: infrequent (G. Lanfranco as at San Anton (Borg; S. & C.G.; Wolseley); Attard, Lija, Buskett, Valetta, Floriana Glacis (Borg). *Gozo*: Rabat (Borg, Penza).

Naturalized in S. Europe; casual elsewhere in Europe; also found in remainder of Mediterranean region, southern Asia, Java and America.

A. caudatus L., Love-lies-bleeding, with long pendulous red or rarely green inflorescences, according to Borg was cultivated for ornament and often naturalised in gardens.

XXIII. NYCTAGINACEAE

Herbs, shrubs or woody climbers, often with swollen nodes. Leaves simple, entire, exstipulate. Flowers solitary or in small terminal umbels (rarely in whorls), subtended by bracts which often simulate a perianth. Perianth petaloid, tubular, with a short, 5-lobed limb; lower part of tube persistent and concrescent with the fruit to form an achene-like anthocarp. Stamens usually 3-5. Ovary superior, 1-celled, containing a single ovule.

1. *Mirabilis* L.

Perennial herbs with opposite leaves. Flowers in axillary cymes, each flower surrounded by a tubular or narrowly campanulate, calyx-like involucre of 5 bracts. Perianth infundibuliform, with a long tube, contracted above the ovary, and a spreading, plicate, slightly 5-lobed limb. Stamens 5. Anthocarp coriaceous.

1. *M. jalapa* L.

Plate VII

Hummejr
Marvel-of-Peru

Glabrous or slightly pubescent. Stems 50-100 cm. high, erect. Leaves ovate, acuminate. Flowers in crowded terminal cymes, opening in the afternoon. Perianth red, yellow, white or parti-coloured; limb c. 25 mm. in diameter; tube 25-35 mm. long. Fl. 12-6.

Cultivated and often escaping. *Malta* and *Gozo*; frequent (Borg; Wolseley).

Native of Tropical America, cultivated for ornament elsewhere.

XXIV. PHYTOLACCACEAE

Herbs, shrubs or trees with alternate, entire leaves. Flowers in racemes. Perianth-segments 5, free, persistent. Stamens hypogynous. Carpels united at least at the base, each containing a single ovule.

1. *Phytolacca* L.

Herbs, shrubs or trees. Racemes usually opposite the leaves. Perianth-segments small, between sepaloïd and petaloïd in colour and texture. Stamens 10 or more; carpels 10 or fewer. Fruit a berry.

Herb, somewhat woody at base; flowers hermaphrodite; racemes erect

Dioecious tree; racemes drooping

1. *P. americana* L.
P. decandra L.

1. *americana*
2. *dioica*

Russett
Pokeweed

A glabrous, perennial herb, somewhat woody at the base. Stems 1-3 m. high, subdichotomously branched, often red, with decurrent ridges from the leaf-bases. Leaves 12-25 x 5-10 cm., ovate-lanceolate, petiolate. Racemes c. 10 cm. long, more or less erect. Flowers hermaphrodite. Perianth-segments 2.5 mm. long, broadly ovate, greenish-white, turning reddish in fruit. Stamens 10. Carpels 10, united except for the styles. Fruit 10 mm. in diameter; depressed-globose, purplish-black. Fl. 6-12.

Waste places and gardens. *Malta*: rather rare. San Anton, fortifications and ditches of Valletta (S. & C.G.; Borg); Attard, Lija, Buskett, Ghajn il-Kbira (Borg), Rabat (Wolseley).

Waste places. Cultivated for ornament and for dye from the berries; widely naturalized in S. Europe, and locally or as casual in C. Europe; native of America.

2. *P. dioica* L.

Plate VII

Tree Pokeweed

Dioecious small tree with stout branches. Leaves 6-12 x 2.5-6 cm., evergreen, ovate to lanceolate, petiolate, glabrous. Racemes drooping. Perianth-segments c. 3.5 mm. long, oblong, green, spotted with white. Stamens c. 25, exceeding the perianth. Carpels 7-10, united only in lower part. Fruit subglobose, purplish-black.

Commonly planted and occasionally self-sown. *Malta*: Ta' Braxja, Mosta, Lija, Kalkara (S. & C.G.); St. Andrews, Ghemieri, Rabat (Wolseley); Bur Marra (Gauci). *Gozo*: Ghajnsielem (S. & C.G.).

Widely planted in the Mediterranean region; native of S. America.

According to Borg, *Rivina humilis* L. and *R. laevis* L., natives of Tropical America, are often planted as ornamental shrubs, and frequently become almost naturalised as at San Anton, Argotti, Lija and Attard.

XXV. AIZOACEAE

Herbs or shrubs. Leaves usually opposite and fleshy. Calyx tubular or turbinate, often with fleshy lobes. Petals usually numerous. Ovary usually inferior. Fruit woody and opening on moistening, or fleshy and indehiscent.

1. Leaves ovate-cordate
Leaves not ovate-cordate
2. Stigmas 8-20; fruit fleshy; seeds embedded in mucilage
Stigmas 5; fruit a woody capsule; seeds not embedded in mucilage
3. Aptenia
1. *Carpobrotus*
2. *Mesembryanthemum*

1. *Carpobrotus* N.E. Br.

Procumbent woody perennials. Leaves opposite, 3-angled, very fleshy. Flowers solitary, peduncled. Petals numerous. Stigmas 8-20. Ovary inferior; fruit fleshy, indehiscent; seeds embedded in mucilage.

Leaves glaucous, broadest at or above the middle; stamens purple

1. *acinaeiformis*

Leaves not glaucous, not broadening above the base; stamens yellow

2. *edulis*

1. *C. acinaeiformis* (L.) L. Bolus

Plate VII

Xuxet San Gwam

Mesembryanthemum acinaeiforme L.

Glaucous Hottentot Fig

Stems up to 2 m. high. Leaves glaucous, broadest at or above the middle, abruptly contracted to the acute apex; dorsal angle horny. Flowers c. 12 cm. in diameter, purple; stamens purple. Fl. 3-6.

Marine slopes and rocks. *Malta*, *Gozo* and *Comino*; widely cultivated and naturalised (Borg; G. Lanfranco; Wolseley).

Naturalised on the coasts of S. & S.W. Europe; native of S. Africa.

2. *C. edulis* (L.) N.E. Br.

Hottentot Fig

Mesembryanthemum edule L.

Stems up to several metres long. Leaves not glaucous, not broadening above the middle, tapering gradually to the acute apex; dorsal angle serrulate. Flowers c. 9 cm. in diameter, yellow or purple; stamens yellow. 2n = 18. Fl. 3-4.

Naturalized in old gardens, and waste places near old buildings (Borg).

Native of S. Africa.

2. *Mesembryanthemum* L.

(*Cryophytum* N.E. Br.; *Gasoul* Adanson)

Herbs. Leaves fleshy, flat or subterete, alternate or opposite. Flowers solitary or in cymes. Petals numerous. Stigmas 5. Ovary inferior; capsule with 5 valves, winged on the angles.

Leaves narrowly oblong, subterete
Leaves spatulate to broadly ovate

1. *M. nodiflorum* L. Plate VII

Kristallina tal-blat
Round-leaved Mesembryanthemum

More or less procumbent up to c. 20 cm. high. Leaves narrowly oblong, subterete, obtuse, glaucous and slightly crystalline-papillose. Flowers terminal and axillary, solitary, subsessile. Petals shorter than sepals, yellowish or white. Fl. 4-7. Sandy and rocky places near the sea. *Malta* and *Gozo*: common (S. & C.G.; Borg; G. Lanfranco; Wolseley; Haslam). *Cominotto* (Duthie). *Filfla* (S. & C.G.; Borg; Comino and Selmun (Borg; Wolseley).

Mediterranean region extending to C. Portugal; Canary Islands and S. Africa.

2. *M. crystallinum* L.

Kristallina tar-ramel
Silvery-leaved Mesembryanthemum

Like *M. nodiflorum* but whole plant densely crystalline-papillose; leaves spatulate to broadly ovate, flat; petals longer than sepals. Fl. 3-5.

Sandy places near the sea. *Malta*: rare (G. Lanfranco), as at Qala San Tumas near Marsaskala, Manoel Island (S. & C.G.; Borg); St. Julians, and Kajenza (Borg); Ponsonby garden (Gulia); Gzira (GD.; Borg).

Mediterranean region extending to Portugal; S. Africa; Australia; California and Canary Islands.

3. *Aptenia* N.E. Br.

Like *Mesembryanthemum* but with 4 stigmas and a 4-locular capsule; valves without wings.

1. *A. cordifolia* (L. fil.) N.E. Br.

Broad-leaved Mesembryanthemum

Procumbent perennial. Leaves opposite, ovate-cordate, finely papillose, flat not glaucous. Flowers axillary and terminal, pedunculate. Petals purple. Fl. 3-5. Naturalized in old gardens and by old buildings (Borg).

Native of S. Africa.

XXVI. PORTULACACEAE

Annual or perennial herbs, usually glabrous and fleshy. Leaves simple, entire. Flowers solitary or in cymes, hermaphrodite. Sepals ('bracteoles') 2; petals ('perianth-segments') 4-6, free or joined below; stamens 3 to many. Ovary unilocular, with 1 to many campylotropous ovules on a basal placenta. Fruit a capsule; seeds with curved embryo.

1. *Portulaca* L.

Glabrous fleshy herbs with alternate or opposite leaves and small setaceous stipules. Flowers often terminal. Petals fugacious; stamens numerous; ovary semi-inferior. Capsule unilocular with a thin wall, dehiscing with a transverse lid. Seeds numerous, reniform.

1. *P. oleracea* L.

Plate VII

Burdleqa
Purslane

Annual with branched stems up to 50 cm. high. Leaves mostly scattered and alternate, but subopposite and crowded below the flowers, oblong-obovate, sessile with a cuneate base, shining. Flowers solitary or two or three together, often

1. *nodiflorum*
2. *crystallinum*

terminal. Sepals c. 4 mm. long, keeled, joined into a short tube at the base; petals 5, 6-8 mm. long, obovoid; seeds c. 0.5 mm., black. $2n = 54$. Fl. 5-10.

The common plant is referable to subsp. *oleracea* and has the stems procumbent or decumbent. Subsp. *sativa* (Haw.) Celak, is robust, erect and larger in all its parts and is sometimes cultivated as a salad plant (Borg).

In cultivated places. *Malta* and *Gozo*: very common (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Comino*: common (Borg).

A weed of cultivation in temperate and warm regions all over the world; native range unknown.

XXVII. CARYOPHYLLACEAE

Herbs, more rarely small shrubs. Leaves usually opposite and decussate, more rarely alternate or verticillate, simple, entire, with or without scarious stipules. Flowers actinomorphic, usually hermaphrodite, often in bracteate dichasia. Sepals 4-5, free, or fused and often united by scarious strips of tissue (commisures) alternating with the calyx-teeth. Petals (0) 4-5, free. Stamens usually 4-10, obdiplostemonous. Ovary superior, unilocular at least above, with 1 to numerous campylotropous ovules on a basal or free-central placenta; stigmas (1) 2. Fruit usually a capsule, dehiscing with teeth equalling the styles in number or twice as many; more rarely a fruit, berry or achene.

1. Stipules present, though sometimes caducous
Stipules absent

2.
6.

2. Fruit with persistent inflated peduncle, and crowned by spiny processes
Fruit not so

9. *Pteranthus*
3.
4.
5.

3. Stigmas 1 or 2
Stigmas 3 or 5

4. Leaves aristate; plant erect
Leaves not aristate; plant procumbent

7. *Paronychia*
8. *Herniaria*

5. Leaves obovate or orbicular
Leaves subulate, linear or linear-lanceolate

10. *Polycarpon*
11. *Spergularia*

6. Sepals free, or joined only at base
Sepals joined to form a distinct calyx-tube

7.
12.

7. Capsule teeth as many as styles
Capsule teeth twice as many as styles

8.
10.

8. Styles fewer than sepals
Styles as many as sepals

2. *Minnartia*
9.

9. Capsule teeth shallowly bifid; leaves ovate
Capsule teeth entire; leaves subulate

5. *Myosoton*
6. *Sagina*

10. Petals bifid to at least halfway
Petals bifid to less than halfway, or entire

3. *Stellaria*
11.

11. Styles 3
Styles 5

1. *Arenaria*
4. *Cerastium*

12. Calyx tube without commissural veins; styles 2 or 3
Calyx tube with commissural veins alternating with the mid-veins
of the sepals; styles 3-5
13. Capsule-teeth twice as many as styles or teeth bifid
Capsule-teeth as many as styles, entire
14. *Vaccaria*
13. *Silene*
12. *Agrostemma*

Subfam. ALSINOIDEAE

Leaves opposite; stipules absent. Petals usually well developed; sepals free or joined only at base.

1. *Arenaria* L.

Annual, biennial or perennial herbs. Leaves opposite, entire, very variable in shape from orbicular to subulate. Flowers usually in few-flowered cymes, sometimes solitary, 5-merous (rarely 4-merous). Sepals free; petals usually entire, white (or very rarely pink); stamens (8) 10; styles 3 (-5). Capsule conical to cylindrical, dehiscent with twice as many teeth as styles; teeth narrow, acute. Seeds several, reniform, usually dark brown, smooth, tuberculate.

1. *A. serpyllifolia* L. subsp. *leptoclados* (Reichenb.) Nyman Thyme-leaved Sandwort
Plate VIII

A slender scabrid-puberulent, often glandular annual, rarely biennial; stems 3-30 cm. high, usually profusely branched at the base, ascending or erect. Leaves 2.5-8 mm. long, broadly ovate to ovate-lanceolate, acute or acuminate, 3- to 5-veined, the lower petiolate, the upper sessile. Flowers in diffuse dichasia, pedicels usually longer than sepals. Sepals acute, 3- to 5-veined; the inner with a scarious margin, the central green part being one third to a half the width of the sepal; petals a half to two thirds as long as the sepals, white. Capsule less than 3 mm. long, slightly exceeding the sepals, straight-sided. Ripe seeds 0.4 x 0.4 mm. $2n = 20$. Fl. 3-5.

Malta: very rare, Bubaqra near Zurrieq (S. & C.G.; Borg).

Dry, usually sandy places, almost throughout Europe.

2. *Minuartia* L.

Like *Arenaria* but leaves usually narrowly lanceolate, setaceous or subulate, capsule dehiscent with as many teeth as styles; capsule-teeth wide and obtuse; seeds 1 to many, smooth, tuberculate or fimbriate. (*Alsine* auct.; *Rhodalsine* Gay).

1. Perennial; petals pink.
Annual; petals white
2. Capsule shorter than sepals; sepals 2-3 (-3.25) mm. long; seeds 0.3-0.4 mm. in diameter
Capsule 1-1½ times as long as sepals; sepals (2-) 3-4 mm. long; seeds (0.3-) 0.4-0.6 mm. in diameter
3. *geniculata*
1. *viscosa*
2. *hybrida*
1. *M. viscosa* (Schreber) Schinz & Thell.
Alsine tenuifolia var. *viscosa* Schreber
- Viscid Sandwort

Annual with rather slender, erect stems branched usually from above the middle; branches usually erect, more rarely erect-patent; plant glandular-pubescent, often densely so, rarely glabrous. Leaves 4-9 (-12) mm. long, linear-subulate. Cymes lax; pedicels 3-8 mm., slender. Sepals 2-3 (-3.25) mm., lanceolate,

petals distinctly shorter than sepals. Capsule shorter than sepals. Seeds 0.3-0.4 mm., almost smooth. $2n = 46$. Fl. 3-6.

Uncultivated places. *Malta*: rather rare, Valletta glacis (Crocefisso); Marsa, Zurrieq (Nigret); Hagar Qim, Mnajdra (Borg). *Gozo*: (Gulia).

Widespread, but local in continental Europe.

2. *M. hybrida* (Vill.) Schischkin subsp. *hybrida* Fine-leaved Sandwort
Alsine tenuifolia (L.) Crantz

Annual, with erect stems 3-10 cm. high, branched at the base and from above the middle; plant usually glandular-pubescent, at least above, rarely glabrous. Leaves up to 12 mm. long, cymes lax, many-flowered; pedicels 5-20 mm. long. Sepals 3-4 mm. long, linear to ovate-lanceolate; petals white, slightly shorter than the sepals; anthers yellow. Capsule one to one and a half times as long as the sepals. Seeds (0.3-) 0.4-0.6 mm., minutely tuberculate, reddish-brown. Fl. 3-6.

Uncultivated places. *Malta*: rather rare, Hagar Qim, Zurrieq, Marsa (S. & C.G.; Borg); Kordin (Duthie; S. & C.G.); Mnajdra (Borg); Floriana (Penza).

Dry sandy places S. & W. Europe, extending northwards to England, C. Germany and S. Ukraine; Siberia; occasionally naturalized elsewhere.

3. *M. geniculata* (Poiret) Thell. Plate VIII Ramlina Ghawdxija
Alsine procumbens (Vahl) Fenzl. Woody Sandwort

Glandular-pubescent perennial; stems up to 30 cm. high, woody at base, procumbent and ascending, geniculate, much-branched. Leaves (4-) 6-10 (-12) x (0.5-) 1-2 (-2.5) mm., elliptical to linear, with one prominent vein beneath. Flowers axillary and in terminal cymes; pedicels one and a half to six times as long as the sepals. Sepals 3-4 mm. long, oblong-ovate, usually obtuse, appearing vein-less, with a wide scarious margin; the pink petals and capsule about equalling the sepals. Seeds 0.5-0.8 mm., margin slightly rugose. Fl. 4-5.

Open arid places, near the sea. *Malta*: rare, Malta peninsula (S. & C.G.; Borg); Ras il-Pellegrin (GD.; Borg); Gnejna, Għajn Tuffieħa (Borg). *Gozo*: in many places on the coast and sometimes abundant, e.g. at Dwejra, Ramla, Marsalforn, Ta' Cenè etc (S. & C.G.; Borg).

Dry sandy places, often by the sea. Mediterranean regions; Portugal; Canary Islands.

3. *Stellaria* L.

Annual or perennial herbs. Inflorescence usually a dichasium; flowers rarely solitary or 2 together; bracts scarious or herbaceous. Sepals 5; petals 5 or fewer, or absent, white, rarely greenish, usually deeply bifid; stamens 10 (11) or fewer, or absent; nectaries usually present; styles 3. Fruit a globose to cylindrical capsule, dehiscent with 6 teeth usually to about the middle.

1. Stems hairy all round
Stems with 1 (2) lines of hairs, or rarely glabrous
2. Stamens (2-) 10 (-11); seeds usually 1.1-1.7 mm. in diameter;
petals equalling or exceeding sepals
1. *media* subsp. *cupaniara*
2. *neglecta*

Stamens (0-) 3-5 (-10); seeds usually less than 1.3 mm. in diameter; petals usually shorter than sepals or absent

3. Sepals usually more than 3 mm. long; seeds usually more than 0.8 mm. in diameter, dark reddish-brown; petals usually present

1. *media* subsp. *media*

Sepals usually less than 3 mm. long; seeds usually less than 0.8 mm. in diameter, light yellowish-brown; petals absent (rarely minute)

3. *pallida*

1. *S. media* (L.) Vill.

Plate VIII

Harira bajda

Common Chickweed

Stems up to 90 cm. high. Lower leaves ovate, acute or acuminate, with long petioles; upper more or less sessile. Inflorescence few- or many-flowered; pedicels patent or erect in fruit. Sepals 3-7 mm. long; petals shorter than or slightly longer than sepals; stamens (0-) 3-10. Seeds usually dark reddish-brown.

Subsp. *media* has the stems up to 40 cm. high, with 1(2) lines of hairs, or rarely glabrous; leaves usually glabrous; inflorescence glandular, lax or dense; sepals usually 3.5 mm. long; petals equalling or slightly shorter than sepals, or absent (var. *apetala* Gaudin); stamens (0-) 3-5 (-10); seeds usually 0.8-1.3 mm. in diameter with rounded, rarely conical tubercles. $2n = 40, 42, 44$. Subsp. *cupaniana* (Jordan & Fourr.) Nyman has the stems up to 90 cm. high, pubescent all round throughout, usually glandular; leaves puberulent or pubescent, often glandular; inflorescence densely glandular pubescent, lax; sepals usually 6-7 mm. long; petals equalling or slightly longer than sepals; stamens usually 10; seeds 1.3-1.5 mm. in diameter with conical tubercles.

Gardens, fields, other disturbed, open habitats. *Malta, Gozo and Comino*: common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mainly ruderal. Throughout the cold and temperate regions of both hemispheres.

2. *S. neglecta* Weihe

Greater Chickweed

S. media var. *neglecta* (Weihe) Fiori et var. *grandiflora* sensu Borg

Stems up to 80 cm. high, with 1 line of hairs down each internode, eglandular. Lower leaves ovate, subcordate at base, acute or acuminate, more or less glabrous, petiolate; upper leaves usually sessile. Inflorescence few- or many-flowered; pedicels long, slender, usually deflexed in fruit. Sepals usually 5-6.5 mm. long; petals equalling or slightly exceeding sepals; stamens (2-) 10 (11). Seeds usually more than 1.1 mm. in diameter, often 1.3-1.6 mm., usually dark reddish brown, with conical tubercles. $2n = 22$. Fl. 1-6.

Fields, gardens and valleys. *Malta, Gozo and Comino*: common (Borg).

W., S. and C. Europe extending to S. Sweden and S. Ukraine.

3. *S. pallida* (Dumort.) Piré

Lesser Chickweed

S. media var. *pallida* Dumort.

Stems up to 30 cm. high, very slender, with 1 line of hairs down each internode, rarely glabrous. Leaves ovate, subacute, glabrous, usually all petiolate. Inflorescence few- or many-flowered; pedicels short, filiform, patent or erect in fruit. Sepals usually less than 3 mm. long, often grey-tomentose; petals absent or

minute; stamens 1-3, very rarely 5. Seeds usually less than 0.8 mm. in diameter, pale yellowish-brown, rarely dark brown, with rounded or conical tubercles. $2n = 22$. Fl. 1-6.

Fields and gardens. *Malta, Gozo and Comino*: very common (Borg; G. Lanfranco; Wolseley).

W., S. and C. Europe, extending to S. Sweden, Latvia and Ukraine.

4. *Cerastium* L.

Herbs, sometimes slightly woody at base, usually hairy. Flowers usually in cymose inflorescences, sometimes solitary. Sepals free; petals white, usually bifid or emarginate, sometimes absent; stamens 5-10, rarely fewer; nectaries present; styles usually 5, opposite the sepals, sometimes 3, 4 or 6. Fruit a cylindrical or oblong capsule, often more or less curved, dehiscent with twice as many teeth as styles. Seeds numerous, spherical or reniform.

1. Sepals without eglandular hairs that protrude well beyond their apex

3. *ligusticum*

Sepals with eglandular hairs that protrude well beyond their apex

2.

2. Pedicels longer than sepals

1. *brachypetalum*

Pedicels shorter than sepals

2. *glomeratum*

1. *C. brachypetalum* Pers.

Widen il-gurdien bajda
Grey Mouse-ear

Annual up to 40 cm. high; stem with long, deflexed, patent or ascending eglandular hairs, with or without glandular hairs. Leaves up to 20 mm. long, the lower spatulate or obovate, the upper ovate, elliptical or oblong, obtuse to acute, hairy. Inflorescence more or less lax; pedicels 3-27 mm. long, bent just below the flower, with patent or ascending-appressed eglandular hairs, with or without glandular hairs; bracts herbaceous. Sepals 3-6.5 mm. long, lanceolate to oblong-lanceolate, obtuse to acute, margin scarios, with long eglandular hairs exceeding the apex, with or without glandular hairs; petals shorter than or longer than sepals, bifid for up to a third of their length, with a small auricle at base; stamens up to 10; styles 5. Capsule 6-9 mm. long. Seeds 0.4-1 mm., minutely tuberculate. Fl. 3-4.

Malta: The status of this species needs looking into. S. & S.G. say scattered, but more frequent than *C. glomeratum*. Borg says rather rare, in cool moist places and that the plants have practically no glandular hairs, subsp. *brachypetalum*. The common plant of Sicily, subsp. *roeseri* (Boiss. & Heldr.) Nyman is densely glandular-hairy, and it is possible that Borg has included some of this race under *C. glomeratum*.

S., W. and C. Europe, extending northwards to S. Sweden and eastwards into Siberia.

2. *C. glomeratum* Thuill.

Plate VIII

Widen il-gurdien idellek
Broad-leaved Mouse-ear

Annual up to 30 (-45) cm. high; stem with eglandular and glandular hairs. Leaves 5-25 mm. long, the lower oblanceolate to obovate, the cauline ovate or elliptic-ovate, obtuse, hairy. Flowers in compact cymose clusters, pedicels shorter

than sepals; bracts herbaceous. Sepals 4-5 mm. long, lanceolate, acute, with a narrow scarious margin, with glandular hairs and eglandular hairs exceeding the apex; petals more or less equalling or shorter than sepals (rarely absent, var. *apetalum* Dumort), bifid for up to a quarter of their length; stamens 10; styles 5. Capsule 6-10 mm. long. Seeds 0.4-0.5 mm. in diameter, pale brown, finely tuberculate. $2n = 72$. Fl. 12-4.

Cultivated and waste places, along paths. *Malta* and *Gozo*: common (S. & C.G.; Borg. G. Lanfranco; Wolseley).

Cosmopolitan.

3. *Cerastium ligusticum* Viv.
C. campanulatum Viv.

Large-flowered Mouse-ear

Annual, rarely more than 15 cm. high; stem with fine glandular and occasionally eglandular hairs. Lower leaves spatulate, cauline elliptical or oblong, hairy, up to 20 mm. long. Pedicels much longer than sepals; bracts herbaceous. Sepals 4-6 mm. long, ovate-lanceolate, obtuse; petals one and a half times as long as sepals, bifid for up to a third of their length, glabrous; stamens 10; styles 5. Capsule 6-7 mm. long; seeds 0.5-0.65 mm. in diameter, brown, sharply and minutely tuberculate, $2n = 34$. Fl. 1-3.

Cultivated and waste places. *Malta*: rare (Borg); given for various places by Delicata; specimens (without location) are in the *Malta* University herbarium. It was not found by S. & C.G.

E. & C. Mediterranean region.

5. *Myosoton Moench*

Perennial. Leaves ovate. Inflorescence a leafy dichasium; flowers 5-merous. Petals white, deeply bifid; stamens 10; styles 5, alternating with the sepals. Fruit an ovoid capsule, dehiscing to almost half-way with 5 shortly bifid, blunt teeth. Seeds numerous, reniform, tuberculate. (*Malachium* Fries).

1. *M. aquaticum* (L.) Moench
Stellaria aquatica (L.) Scop.

Plate VIII

Water Chickweed

Flowering stems 20-120 cm. high, decumbent or ascending, weak, glandular, hairy above. Leaves 2-5 (-8) cm. long, thin, ovate, acute to acuminate at apex, truncate or cordate at base, hairy or glabrous, shortly petiolate, or the upper sessile. Petals white, bifid to the base, exceeding the obtuse sepals. Ripe capsule exceeding the sepals, pendulous from the patent pedicel. $2n = 28$.

Moist places and ponds. *Malta*: Gharghur and Wied Balluta, very rare (Delicata).

Europe, northwards to 65°N. in Fennoscandia; temperate Asia.

6. *Sagina* L.

Small annual or perennial herbs, often caespitose, with slender procumbent or ascending flowering stems and subulate to linear-lanceolate leaves in slightly connate pairs. Flowers 4- to 5-merous, almost globose in bud, solitary or in few-flowered cymes. Sepals free; petals usually white, entire, often minute, sometimes 0; stamens as many or twice as many as the sepals; styles 4-5, alternating with the sepals. Fruit a capsule splitting to the base into 4 or 5 valves. Seeds numerous.

1. Perennial; branches long, procumbent, rooting, from a central rosette of leaves; main stem not flowering 1. *procumbens*
Annual; branches ascending or erect, not rooting; main stem flowering 2.

2. Leaves with a well-marked arista; mean seed-size less than 0.4 mm. 2. *apetala*
Leaves mucicous or very shortly mucronate; mean seed-size more than 0.4 mm. 3. *maritima*

1. *S. procumbens* L. subsp. *procumbens*

Procumbent Pearlwort

A mat-forming perennial with short non-flowering main stem bearing a dense central leaf-rosette, and numerous lateral stems up to 20 cm. high, ascending from procumbent rooting bases; usually glabrous, sometimes minutely ciliate. Leaves 5-12 mm. long, linear-subulate, shortly aristate, glabrous or rarely ciliate. Flowers solitary, 4 (-5) merous; pedicels 5-20 mm. long, glabrous. Sepals 1-2.5 mm. long, ovate, obtuse; petals usually minute or absent, sometimes conspicuous and as long as the sepals; stamens 4 (-5). Ripe capsule 2-3 mm. long, longer than the usually patent sepals. $2n = 22$.

Waste places and by roads and footpaths. *Malta*, *Gozo* and *Comino*: frequent (Borg).

Europe, Asia, Greenland, N. America, widely introduced in southern hemisphere.

2. *S. apetala* Ard.

Annual Pearlwort

Annual; stem (1-) 3-10 (-20) cm. high, erect or ascending, with non-persistent basal leaves in a lax cluster, simple or with decumbent (rarely quite procumbent) to ascending non-rooting branches. Leaves linear, long-mucronate to aristate, usually more or less ciliate towards the base. Flowers usually 4-merous, solitary; pedicels filiform, often glandular-hairy at least above. Sepals ovate to ovate-oblong, rounded to acute at the apex, often hooded; petals minute, often falling early, rarely absent. Ripe capsule equalling or exceeding the patent or appressed sepals. Mean seed-size less than 0.4 mm. $2n = 12$. Fl. 2-4.

Both subsp. *apetala* (*S. ciliata* Fries) with the fruiting sepals appressed or slightly patent and subacute, the terminal capsule of well-grown plants about 1½ times as long as sepals, and the mean seed-size more than 0.34 mm., and subsp. *erecta* (Hornem.) F. Hermann (*S. apetala* auct. mult.) with the fruiting sepals patent and subobtusate; the terminal capsule of well-grown plants more than 1½ times as long as sepals, and a mean seed size of less than 0.34 mm. occur. *S. melitensis* Gulia ex Duthie which often overwinters, and has obtuse or subacute slightly patent sepals may also merit subspecific rank.

Along paths and in other waste places. *Malta*, *Gozo* and *Comino*: common (Borg).

Europe northwards to Scotland, S. Sweden and Estonia; N. Africa; W. Asia; S. America.

3. *S. maritima* G. Don

Plate VIII

Gawhra tax-xatt
Sea Pearlwort

Annual, usually glabrous, with or without a central rosette of leaves, main stem flowering, it and the numerous lateral branches varying from procumbent to erect; sometimes densely caespitose. Leaves linear-lanceolate, somewhat fleshy, obtuse or mucronulate but not aristate, rarely ciliate. Flowers usually 4-merous, solitary; peduncles erect, glabrous, filiform. Sepals ovate, obtuse, not mucronate,

often with purplish margin; petals minute or absent. Ripe capsule equalling or slightly shorter than the obliquely erect but not appressed sepals. Mean seed-size more than 0.4 mm. $2n = 22-24, 28$, Fl. 2-4.

Waste and trampled places, along paths, on paved places, inland as well as near the sea. *Malta, Gozo and Comino*: very common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Coasts of Europe from Bulgaria and S.W. Finland westwards and northwards to 68°N. in Norway; occasionally inland, and on mountains up to 1,300 m. high in Scotland; N. Africa.

Subfam. PARONYCHIOIDEAE

Leaves opposite, alternate or verticillate; stipules present. Petals often very small or absent; sepals free.

7. *Paronychia* Miller

Herbs, sometimes woody at base, with erect to procumbent, usually much-branched stems. Leaves opposite (or sometimes apparently alternate), elliptical to linear; stipules usually conspicuous, scarious. Flowers small, slightly perigynous, in axillary, rarely terminal, spherical clusters; bracts scarious, usually silvery and often very conspicuous and concealing the flowers. Calyx very deeply 5-lobed, lobes often cucullate and awned, and often with membranous margins; petals minute or absent; stamens 5; styles 2, or sometimes fused but bifid near apex or with oblique stigma (rarely conical and subentire). Fruit an achene with membranous pericarp.

Calyx lobes with membranous margins, cucullate, awned on the back near the apex

1. *argentea*

Calyx lobes entirely herbaceous, not cucullate or awned

2. *capitata*

1. *P. argentea* Lam.

Plate VIII

Silvery *Paronychia*

Perennial; stems 5-30 cm. high, usually procumbent, much-branched, matted internodes usually equalling or longer than the leaves. Leaves 4-8 (-20) mm. long, ovate to lanceolate. Flower-clusters usually more than 8 mm. in diameter, well defined; bracts 4-6 mm. long, ovate, acute, silvery, concealing the flowers. Calyx 1.5-2.5 mm. long, lobes equal, oblong, cucullate; awn smooth or scarcely spinulose; membranous margins equalling or wider than the brownish, usually smooth mid-vein. Fl. 2-6.

Sandy places near the sea, and arid areas inland. *Malta*: rare, Wied Hoxt near Qrendi (S. & C.G.; Borg); Marsa, Sliema (GD.; Borg).

Mediterranean region.

2. *P. capitata* (L.) Lam.

Capitate *Paronychia*

Laxly caespitose perennial; stems up to 15 cm. long, much-branched. Leaves 3-6 mm. long, oblong-lanceolate to linear-lanceolate, acute, pubescent, ciliate, greyish green. Flower-clusters c. 10 mm. long, conspicuous; bracts 6-10 mm. long, greatly exceeding and concealing the flowers. Calyx 2.5-3.5 mm. long; lobes very unequal the shortest two thirds to three quarters as long as the longest, entirely herbaceous. Fl. 4-5.

Malta plants are said to have ovate or oblong leaves, bracts which scarcely conceal the flowers, and slightly wider calyx-lobes than the typical plant. They are often treated as a separate species, *P. macrosepala* Boiss., but require further investigation.

Malta: Floriana, rare (Borg; G. Lanfranco).

S. Europe.

8. *Herniaria* L.

Like *Paronychia*, but flowers sometimes 4-merous; bracts inconspicuous; stigma notched or bifid, subsessile or rarely on a distinct style.

Leaves and sepals glabrous or ciliate only

1. *glabra*

Leaves and sepals conspicuously hairy

2. *hirsuta*

Plate VIII

Smooth Rupture-wort

1. *H. glabra* L.

Annual to perennial, rarely woody at base; stems subglabrous or with short hairs all round. Leaves up to 7 x 3.5 mm., elliptic-obovate, glabrous, or rarely more or less ciliate; upper stipules and bracts very rarely with purplish-black colouration. Flowers c. 1 mm. long, clusters usually contiguous on short leafless branches. Sepals c. 5 mm. long. Capsule usually distinctly exceeding sepals. $2n = 18$, Fl. 4-8.

Open places. *Malta*: rare, Wied Babu (GD.; Borg).

Most of Europe except the extreme north; N. Africa; Asia.

Hairy Rupture-wort

2. *H. hirsuta* L.

Annual; stems slender, usually with regularly alternating branches, with patent hairs. Leaves elliptical to oblanceolate, covered with stiff hairs, or the older sometimes only ciliate; stipules ciliate. Flowers 1-1.5 mm. long, sessile, in dense clusters which are leaf-opposed or contiguous on short branches. Sepals densely hairy; perigynous zone sub-glabrous. $2n = 36$.

Plants with long, stout hairs on the calyx, giving a greyish-white appearance are often distinguished as a distinct species, *H. cinerea* DC.

Waste places and along roads. *Malta* and *Gozo*: frequent and in some places common (S. & C.G.; Borg; G. Lanfranco).

C. Europe and the Mediterranean region.

9. *Pteranthus* Forsk.

Small annual. Flowers sessile, in groups of three. 'Fruit' complex, 1-seeded, described below.

Pteranthus

1. *P. dichotomus* Forsk.

Fleshy annual herb; stems 10-20 cm. high, procumbent to ascending, articulate at the nodes. Leaves linear, subverticillate; stipules minute, lanceolate. Flowers sessile, in groups of 3, situated at the apex of an oblanceolate, swollen, hollow, compressed peduncle, the two lateral flowers sterile; each flower situated between two minutely glandular bracts on which is spirally arranged a row of curved spines. Petals absent; stamens 4; styles 2. Capsule indehiscent, 1-seeded, enclosed

in the spiny bracts and borne on the persistent, compressed, inflated, wing-like peduncle, the whole 'fruit' 12-20 mm. long. Fl. 3-6.

Formerly in sandy and clayey places; now probably extinct. *Malta*: at Marsa etc. (GD.), Marsaskala (Gulia). *Gozo*: Chambray (Gulia). North Africa, Cyprus, and Asia Minor.

10. Polycarpon Loeffl. ex L.

Small herbs; stems ascending or erect, usually branched, usually rough at the angles. Leaves obovate to orbicular, more or less petiolate, opposite, often apparently verticillate. Flowers small, in cymose clusters with scarious bracts. Sepals 5; petals 5, hyaline, shorter than sepals; stamens 1-5, filaments more or less united at the base; style short, 3-lobed. Capsule dehiscent with 3 valves almost to the base; valves twisting spirally into tubes. Seeds several.

Leaves not purplish-tinged; inflorescence lax, spreading with many conspicuous branches; sepals mostly less than 2 mm. long

1. tetraphyllum

Leaves often purplish-tinged; inflorescence more or less condensed, few-flowered, usually without conspicuous branches; sepals more than 2 mm. long

2. alsinifolium

1. P. tetraphyllum (L.) L.

Plate VIII

Four-leaved All-seed

Annual, rarely biennial or perennial, without a woody stock; stems much branched. Leaves green, mostly in whorls of 4. Inflorescence lax, spreading, much branched. Sepals mostly less than 2 mm. long; petals emarginate; stamens (1-) 3-5. Seeds usually less than 0.5 mm., punctulate. Fl. 3-8.

Waste and cultivated places, along paths. *Malta*, *Gozo* and *Comino*: frequent (S. & C.G.; Borg; Wolsley).

Mediterranean region extending northwards in W. Europe to S.W. England; Africa; Asia; Australia; S. America.

2. P. alsinifolium (Biv.) DC.

Few-flowered All-seed

Often biennial or perennial, without a woody stock, stems often branched. Leaves green, at least some in whorls of 4; stipules conspicuous, silvery. Inflorescence often branched, but always rather condensed. Sepals more than 2 mm. long; petals slightly emarginate; stamens always 5. Seeds 0.5 mm. or more in diameter, smooth. Fl. 3-6.

Along roads and by field-paths. *Malta*: Tarxien, Gudja and Qormi (Borg); Ghadira (Kramer and Westra).

Usually coastal. S. Europe.

11. Spergularia (Pers.) J. & C. Presl

Herbs, sometimes woody at the base; stems erect, decumbent or procumbent, dilated at the nodes, somewhat flattened. Leaves linear, decussate, with pale scarious stipules united to surround the node, forming more or less triangular structures on either side of the stem; leaf-fascicles (short leafy lateral branches) when present borne on only one side at each node. Perianth 5-merous; sepals free, green, with scarious margins; petals entire; stamens 1-10; styles 3. Capsule dehiscent with 3 valves. Seeds often winged.

1. Robust, with thick woody stock; sepals usually more than 4 mm. long

1. media

Slender, with more or less slender tap-root; sepals usually less than 4 mm. long

2. Stipules on young shoots connate for about half their length (forming a sheath); seeds light brown

2. marina

Stipules on young shoots connate for considerably less than half their length; seeds more or less dark brown

3.

3. Inflorescence ebracteate above; petals narrowly elliptical; capsule globose

3. diandra

Inflorescence bracteate; petals ovate; capsule ovoid to subglobose

4. rubra

1. S. media (L.) C. Presl

S. marginata Kittel

Arenaria

Greater Sea-spurrey

Perennial; stems 5-40 cm. high, glabrous throughout or glandular-hairy in the inflorescence. Leaves mucronate; stipules broadly triangular, not acuminate. Sepals 4-6 mm. long, petals white or pink, equalling or somewhat exceeding the sepals; stamens 10 (rarely 7-9). Capsule 7-9 mm. long, much exceeding the calyx. Seeds 0.7-1 mm. (excluding wing), dark brown, smooth or tuberculate, usually winged; margin of wing entire or only slightly divided. $2n = 18, 36$. Fl. 2-4.

Sandy places near the sea. *Malta*: rather rare (G. Lanfranco), as at Marsa, Qajjenza (S. & C.G.; Borg); *Gozo*: Dwejra (Duthie; S. & C.G.; Borg); *Xlendi*, *Qbajjar* (Borg).

Coasts and saline inland areas of the temperate zones of both hemispheres.

2. S. marina (L.) Griseb.

S. salina J. & C. Presl

Lesser Sea-spurrey

Annual, biennial or rarely perennial, with slender or slightly fleshy stock. Leaves fleshy, mucronate; stipules short, obtuse, forming a sheath. Sepals 2.5-4 mm. long; petals pink above and white near the base, rarely entirely white, not exceeding the sepals; stamens 1-5 (-8). Capsule (3-) 4-6 mm. long, usually ciliate, unwinged or mixed winged and unwinged; wing of seed when present erose to laciniate. $2n = 36$. Fl. 2-6.

Moist sandy places especially near the sea. *Malta*, *Gozo* and *Comino*: frequent (S. & C.G.; Borg; G. Lanfranco).

Coasts and inland saline areas of the temperate zone of the northern hemisphere.

3. S. diandra (Guss.) Boiss.

Southern Sea-spurrey

Annual or biennial with slender tap-root; stems 3-30 cm. high, slender, ascending. Stipules short, triangular (rarely lanceolate). Inflorescence much-branched, very slender, without upper bracts. Sepals 2-3 mm. long; petals lilac (rarely white), narrowly elliptical, equalling the sepals; stamens 2-3. Capsule 1.5-3 mm. long, globose, about equalling the sepals; valves purple-black at maturity. Seeds 0.6-0.7 mm., unwinged, dark brown to black, rugulose or bristling with rigid papillae. $2n = 18$. Fl. 3-5.

Waste places. *Malta*: rare at Floriana, Kordin (S. & C.G.; Borg); Valletta, Luqa,

Marsa (Borg). Gozo: Xlendi (S. & C.G.; Borg); near Rabat (Duthie; S. & C.G.; Wied il-Lunzjata, Gran Castello (Borg); Marsalforn (Duthie; S. & C.G.; Borg).

S. Europe; S.E. Russia.

4. *S. rubra* (L.) J. & C. Presl

Plate VIII

Arenaria roza
Sand Spurrey

Annual to perennial with slender to somewhat woody tap-root; stems 5-25 cm. high, diffuse, decumbent or procumbent. Leaves very fasciculate; stipules lanceolate, acuminate, silvery. Bracts of the inflorescence almost as large as the leaves. Sepals and petals 3-4 mm. long; petals uniformly pink; stamens (5-) 10. Capsule 4-5 mm. long, about equalling the sepals. Seeds 0.45-0.55 mm., unwinged, dark brown, subtrigonal. $2n = 36, 54$. Fl. 2-6.

Waste and uncultivated places. Malta, Gozo and Comino: common (Borg; G. Lanfranco; Wolseley).

Sandy soils (not halophilous). Throughout Europe; N. Africa; Asia; N. America.

Subfam. SILENOIDEAE

Leaves opposite; stipules absent. Epicalyx-scales (bracteoles) sometimes present. Sepals joined in a tubular or campanulate calyx, sometimes with scarious commissures. Petals usually well-developed; stamens, petals and ovary often situated on a more or less elongated column which forms the carpophore in fruit.

12. *Agrostemma* L.

Erect annuals. Flowers 5-merous; aestivation contorted. Epicalyx absent, calyx with 5, long, linear, foliaceous teeth. Limb of petal more or less distinct from claw; coronal scales present; stamens 10; styles 5, alternating with calyx teeth. Fruit a capsule, dehiscing usually with 5 teeth; carpophore absent. Seeds not bearded at hilum.

1. *A. githago* L.

Plate VIII

Corn Cockle

Lychnis githago (L.) Scop.

Plant covered with long, appressed, greyish hairs; stems 30-100 cm. high. Leaves usually linear, slightly connate, acute, or the lower obtuse. Calyx 3-7 cm. long, the ovoid or oblong tube usually much shorter than the often caducous teeth. Petals shorter than calyx; limb not spotted, dull purple, rarely white. Seeds mostly 3 mm. or more, with prominent acute tubercles. $2n = 48$. Fl. 4-5.

In cultivated land. Malta: rare (G. Lanfranco) as between Zebbug and Wied Inčita (S. & C.G.; Borg); Attard, Buskett, Għirghenti (Borg).

Probably native in Europe only in the E. Mediterranean region, but has spread as a weed to most Temperate regions of the world.

13. *Silene* L.

Herbs or small shrubs of varied habit. Flowers 5-merous. Epicalyx absent. Calyx-tube with (5-) 10-30 veins and 5 short teeth. Limb of petal distinct from claw; stamens 10; styles usually 3 (sometimes 4 on same plant), more rarely 5. Fruit a capsule with variably-developed basal septa (absent in species sometimes treated as a separate genus, *Melandrium*), opening by 6 (more rarely 8 or 10) teeth, twice the number of styles; carpophore present. (Sect. *Eudianthe* has 5

styles and 5 bifid teeth). Seeds variable, but never with a tuft of hairs. (Incl. *Eudianthe* (Reichenb.) Reichenb., *Heliosperma* (Reichenb.) Reichenb., *Melandrium* Röhling., *Orites* Adanson.)

1. Calyx with 20 veins
- Calyx with 10 veins

2. *vulgaris*

2.

2. Perennial with woody stock
- Annual

1. *fruticosa*

3.

3. Plant glabrous
- Plant hairy

4.

5.

4. Carpophore 1-2 mm. long; petal limb 3-6 mm. long.
- Carpophore 5-12 mm. long; petal limb 10-20 mm. long

4. *behen*

5. *caeli-rosa*

5. Seeds with 2 undulate wings on back
- Seeds unwinged

10. *colorata*

6.

6. Carpophore 3-6 mm. long; calyx 13-18 mm. long
- Carpophore 0.5-2 mm. long; calyx 6-13 mm. long

7.

8.

7. Petal-limb 7-10 mm. long; flowers distinctly pedicellate
- Petal-limb 3-5 mm. long; flowers sessile

6. *pendula*

9. *bellidifolia*

8. Calyx strongly contracted at mouth in fruit
- Calyx not contracted at mouth in fruit

8. *gallica*

9.

9. Capsules 5-6 mm. long
- Capsules 8-11 mm. long

3. *sedoides*

7. *nocturna*

1. *S. fruticosa* L.

Woody Catchfly

Robust perennial with woody stock, 20-50 cm. high, almost completely glabrous. Lower leaves obovate or narrowly spatulate; upper lanceolate, all glabrous and shining above, ciliate. Inflorescence paniculate, dense, with opposite branches; flowers large, erect, on short peduncles. Calyx c. 25 mm. long, with patent glandular hairs; teeth acute. Petals pink or red, shallowly bifid; coronal scales obvious, acute, sometimes lacinate. Capsule c. 15 mm. long, ovoid, beak equalling or longer than carpophore. Seeds 1.5-2 mm. Fl. 4-6.

On sloping rocks. Gozo: rare in valley of Xlendi (Duthie; S. & C.G.; Borg; Wolseley); valley of Mgarr ix-Xini (S. & C.G.; Borg; Wolseley).

Mediterranean region from Sicily to Asia Minor, very local.

2. *S. vulgaris* (Moench) Garcke

Qasqajza

Bladder Campion

Perennial, sometimes caespitose and woody at base; stems up to 60 cm. high, usually branched, glabrous or pubescent, often glaucous. Leaves ovate to linear. Flowers solitary or in cymes. Calyx inflated, persistent, loosely investing ripe capsule, 20-veined. Petals large, usually whitish, deeply bifid, with distinct claw

and often with coronal scales. Capsule 6-14 mm. long, usually c. 3 times as long as carpophore. Seeds 1-1.5 mm., with convex back and flat or convex face. Fl. 3-6.

Very variable. Specimens have been seen of subsp. *vulgaris*; stems up to 60 cm. high, ascending or erect; leaves 3-12 x 1-2.5 cm., glabrous or rarely pubescent (var. *pubescens* DC.), ovate-lanceolate; inflorescence usually several-flowered; bracts scarious; capsule c. 10 mm. long with narrow neck and erect teeth; carpophore 3-3 mm. long; $2n = 24$ and subsp. *angustifolia* (Miller) Hayek: like subsp. *vulgaris* but leaves 3-8 x 0.3-1 cm., linear-lanceolate or linear, and subsp. *commutata* (Guss.) Hayek: stems up to 60 cm. high; leaves 4-9 x 2-4 cm.; glabrous or pubescent, broadly oblong-ovate to ovate-elliptic, often obtuse and apiculate; inflorescence several-flowered; bracts scarious; capsule c. 10 mm. long; carpophore 2-3 mm. long; $2n = 48$ has been recorded.

Cultivated ground, along walls and roads and on rocky ground. Malta, Gozo and Comino: frequent (Borg; G. Lanfranco; Wolseley).

Europe, Temperate Asia and N. Africa.

3. *S. sedoides* Poiret

Li'en l-ghasfur irqiq
Hairy Catchfly

Annual 5-20 (-30) cm. high, usually much-branched, erect, slender, densely pubescent with patent hairs. Inflorescence profusely and divaricately branched, the branches forming raceme-like monochasial cymes; pedicels mostly 1-2 times as long as calyx, patent in fruit. Calyx 6-8 (-9) x 2-3 (-3.5) mm., oblong-clavate in fruit, shortly and stiffly pubescent, greenish, rarely reddish; teeth ovate, obtuse or subacute. Petal-limb short, reddish or whitish. Capsule 5-6 mm. long; carpophore 1.5-2 mm. long. Seeds 0.3-0.5 mm., reniform; faces slightly concave, striate; back wide, obtusely grooved. Fl. 3-5.

Rocky and sandy places, near the sea. Malta, Gozo, Comino and Cominotto: frequent on the coasts (S. & C.G.; Borg).

Mediterranean region; local and mainly on islands.

4. *S. behen* L.

Hairless Catchfly

Whole plant glabrous. Annual 15-20 cm. high, simple or branched, rather stout, erect or ascending. Cauline leaves glaucous, usually imbricate. Inflorescence a lax dichasium; lowest pair of internodes of fruiting inflorescence 5-10 cm. long; next pair also long; flowers not overlapping; pedicels stout, usually shorter than calyx. Calyx 11-17 mm. long, ovoid and contracted at mouth in fruit, whitish, with reddish anastomosing veins above; teeth ovate, obtuse; petal-limb 3-6 mm. long, pink. Capsule 9-10 mm. long, ovoid; carpophore 1-2 mm. long, very stout. Seeds c. 1.5 mm., reniform; faces concave-convex, strongly tuberculate-ridged; back wide, plane or slightly convex, with 4 rows of acute conical tubercles. Fl. 3-4.

In cultivated places. Malta: rare in a field above Mellieha (Duthie; Borg); Ta' Baldu near Rabat, in sowed land (S. & C.G.; Borg).

C. & E. Mediterranean region.

5. *S. coeli-rasa* (L.) Godron

Lychnis coeli-rasa (L.) Desr.

Rose Catchfly

Whole plant glabrous. Annual 20-50 cm. high. Leaves linear-lanceolate. Inflorescence an irregular several-flowered dichasium. Calyx 15-28 mm., subclavate and contracted at mouth in fruit, deeply sulcate between veins, with transverse

undulations on each side of the grooves; tube 2-3 times as long as the linear, acuminate or acute, usually patent teeth; petal-limb 1-2 cm. long, pink. Capsule (7-) 10-17 mm. long; carpophore (5-) 7-12 mm. long, glabrous. Seeds subreniform, more or less umbilicate at hilum; faces convex with obtuse conical tubercles; back very broad and convex, with acute tubercles. Fl. 4-5.

Malta: Cultivated, and often met with in old gardens, rubbish heaps and ditches of Floriana and Valletta (Borg).

Mediterranean region; Canary Islands.

6. *S. pendula* L.

Drooping Catchfly

Annual 15-40 cm. high, procumbent-ascending, branched, pubescent. Cauline leaves 2-5 cm. long, ovate to ovate-lanceolate, acute, pubescent. Inflorescence very lax, of raceme-like monochasial cymes. Pedicels usually erect in flower, patent or deflexed in fruit. Calyx 13-18 mm. long, obovoid in fruit, contracted at mouth, very inflated and loose, with wide hyaline bands between the prominent narrow veins; teeth short, ovate- or triangular-obtuse. Petal-limb 7-10 mm. long, pink, rarely white. Capsule 9-12 mm. long, ovoid-conical; carpophore 3-6 mm. long. Seeds 1.3-1.4 mm., subglobose, blackish, faces convex or plano-convex, with concentric rings of small tubercles; back convex or plano-convex, with 7-8 rows of tubercles. Fl. 3-6.

Stony places. Malta: rare, Wied Balluta (GD.); Kalcara (Reade; S. & C.G.; Borg). Also grown in gardens and sometimes occurring on rubbish dumps (Borg).

Mediterranean region; widely introduced elsewhere and sometimes naturalized.

7. *S. nocturna* L.

Li'en l-ghasfur ta' bil-lejl
Night-flowering Catchfly

Annual 10-60 cm. high, erect, usually branched. Lower leaves obovate to lanceolate-spathulate, obtuse, pubescent. Flowers 5-15 in raceme-like monochasial cymes, very densely crowded above, remote below; inflorescence usually compound, sometimes with axillary flowers. Calyx (6-) 9-13 mm. long, oblong-obovoid in fruit, pubescent with ascending hairs; veins wide, green, anastomosing. Petal-limb bifid, exerted. Capsule 8-11 mm. long, oblong or ovoid-oblong; carpophore 1-1.5 mm. long, puberulent. Seeds reniform; faces excavate-auriculate; back wide, with shallow, tuberculate groove. Fl. 2-6.

Cultivated and waste places, particularly along road edges. Malta and Gozo: common (S. & C.G.; Borg; G. Lanfranco; Wolseley). Comino: (Borg; Wolseley).

Mediterranean region and Canary Islands; introduced in N. America.

8. *S. gallica* L.

Small-flowered Catchfly

Annual 5-45 cm. high, erect, simple to much-branched, pubescent, viscid above. Leaves pubescent. Flowers subsecund, in one to many raceme-like monochasial cymes; lower pedicels up to 1½ times as long as calyx, upper short. Calyx 7-10 mm. long, cylindrical-ovoid, becoming ovoid and contracting at the mouth in fruit, hispid, toothed for 1/4 of its length with triangular, acute teeth; veins scarcely anastomosing. Petals white or pink; limb up to 6 mm. long, entire or emarginate. Capsule 6-9 mm. long; carpophore 1 mm. long or less, pubescent. Seeds less than 1 mm., subreniform, dark brown; faces deeply concave, striate; back wide, plane. $2n = 24$. Fl. 4-7.

Cultivated and waste places. *Malta*: rare, Luqa and St. Vincent de Paul hospital (Gulia; Borg); *Gozo*: rare (Gulia).

C. Europe, northwards to Denmark, Poland and C. Russia, and Mediterranean region.

9. *S. bellidifolia* Juss. ex Jacq.
S. vespertina Retz.

Dense-flowered Catchfly

Annual 30-60 cm. high, erect; branched and pubescent or puberulent above; hispid and simple, rarely branched below. Leaves sparsely hispid. Flowers subsessile, usually secund, in dense, raceme-like, long-stalked monochasial cymes. Calyx 14-17 cm. long, cylindrical-clavate, becoming clavate and contracted at mouth in fruit, villous. Petal-lobes 3-5 mm. long, bifid, pink. Capsule 9-11 mm. long; carpophore 4-5 mm. long. Seeds very small, dark brown; faces deeply concave, striate; back wide, shallowly and broadly grooved. Fl. 2-7.

Cultivated places. *Malta*: Wied Hanzir (S. & C.G.; Borg); Wied Balluta (GD; Gulia; Borg). *Gozo*: (?) (Gulia).

Mediterranean region; Portugal.

10. *S. colorata* Poiret
S. sericea auct.

Plate VIII

Lsien l-ghasfur
Mediterranean Catchfly

Whole plant pubescent or puberulent. Annual 10-50 cm. high, decumbent to erect, branched. Leaves linear to ovate-spathulate. Pedicels shorter than calyx, bracts of a pair usually unequal. Calyx 11-13 (-17) mm. long, cylindrical, becoming broadly clavate in fruit; teeth ovate, obtuse, densely ciliate. Petal-lobes 5-9 mm. long, pink or white. Capsule 7-9 mm. long, ovoid; carpophore 5-7 mm. long. Seeds 1-1.5 mm., dark chestnut-brown, reniform with flat faces, back deeply and acutely grooved between two undulate wings. Fl. 11-16.

Plants from exposed and dry localities with decumbent habit, calyx c. 10 mm. long, carpophore c. 4 mm. long and capsule c. 5 mm. long have been called *S. canescens* Ten. (*S. sericea* var. *decumbens* Riv.).

Cultivated and waste places. *Malta*, *Gozo* and *Comino*: very common (Borg; G. Lanfranco; Welseley).

Mediterranean region.

14. *Vaccaria* Medicus

Annual. Epicalyx absent. Calyx-tube inflated below, whitish, with 5 green wings at the angles, without scarious commissures. Petals 5, long-clawed; coronal scales absent; ovary unilocular (almost 2-locular at base); styles 2. Capsule ovoid, with thick papery exocarp dehiscing with 4 teeth, and with thinner endocarp dehiscing irregularly.

1. *V. pyramidata* Medicus
Saponaria vaccaria L.

Plate VIII

Cowherb

Stems 30-60 cm. high, erect, branched above, glabrous. Leaves c. 5 cm. long, ovate to lanceolate, glaucous. Flowers in much-branched dichasia; pedicels long; bracts scarious, with green midrib. Calyx 12-17 mm. long, teeth ovate, acute.

Petal-lobes 3-8 mm. long, sometimes exerted, pale or dark purplish, entire or bifid. Seeds 2-2.5 mm., numerous, subglobose. $2n = 30$. Fl. 3-5.

Cultivated places. *Malta*: Wied Hanzir (S. & C.G.; Borg) Wied Balluta (GD; C. Europe, Mediterranean region and Temperate Asia; naturalized elsewhere.

XXVIII. RANUNCULACEAE

Herbs or rarely woody climbers. Leaves alternate, exstipulate, rarely opposite or stipulate. Flowers usually hermaphrodite and actinomorphic, hypogynous. Perianth petaloid or sepaloid, whorled. Honey-leaves (petaloid structures bearing nectaries) often present, funnel-shaped or petaloid. Stamens numerous, usually spirally arranged, extrorse. Carpels 1-many, usually free and spirally arranged. Fruit usually of 1 or more follicles or a head of achenes.

1. Flowers zygomorphic

2.

Flowers actinomorphic

3.

2. Follicles 2 or more

2. *Delphinium*

Follicles 1

3. *Consolida*

3. Leaves opposite

5. *Clematis*

Leaves alternate or whorled

4.

4. Perianth of one whorl of green or variously coloured segments; nectaries present or absent, but not petaloid

5.

Perianth of 2 dissimilar whorls (or apparently so), the inner of which may consist of petaloid honey leaves

6.

5. Honey leaves present

1. *Nigella*

Honey leaves absent

4. *Anemone*

6. Petaloid whorl of the perianth without nectaries

6. *Adonis*

Petaloid whorl of the perianth with nectaries at base

7. *Ranunculus*

1. *Nigella* L.

Annuals. Leaves usually 2 to 3-pinnatisect into linear segments. Perianth-segments 5, petaloid, persistent for a time after flowering. Honey-leaves 5, opposite to and much smaller than the perianth-segments. Stamens numerous. Fruit of 5 (rarely 10) partly or completely united follicles; styles long, patent or rarely erect.

1. *N. damascena* L.

Plate IX

Sieg il-brimba
Love-in-a-mist

Involucral leaves similar to the lower cauline. Perianth-segments ovate-oblong, clawed, bluish. Lobes of lower lip of honey-leaves about as long as wide. Follicles united for all their length, forming an inflated 10-celled capsule, the 5 outer loculi sterile. Fl. 3-5.

On uncultivated land and rocky wastes, and in valleys, sometimes in cultivated ground. *Malta*, *Gozo* and *Comino*: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley).

S. Europe (frequently cultivated for ornament and more or less naturalized elsewhere); N. Africa; Canaries; Madeira.

2. *Delphinium* L.

Leaves usually about as wide as long and deeply pinnatisect. Flowers zygomorphic. Perianth-segments 5, the upper with a spur. Honey-leaves 4, free; the two upper (nectariferous) with spurs inserted into the spur of the uppermost perianth-segment, and with the limb exerted; the two lateral with wide limb and a narrow claw. Stamens in 8 spirally arranged series. Follicles 3 (-5), free.

Limb of upper honey-leaves with lateral wings; seeds numerous, covered with transverse, membranous scales

Limb of upper honey-leaves unwinged; seeds few, rugose-areolate

- | | | |
|---|----------|-----------------|
| 1. <i>D. halteratum</i> Sibth. & Sm. | Plate IX | Sieq il-hamiema |
| <i>D. peregrinum</i> var. <i>halteratum</i> (Sibth. & Sm.) Borg | | Winged Larkspur |
| et var. <i>longipes</i> (Moris) Borg | | |

Stem 10-70 cm. high, minutely appressed-pubescent (rarely glabrous), few- or many-branched; branches sometimes long, but not virgate. Upper leaves often entire, not shorter than the internodes. Inflorescence 3- to 50-flowered, usually more or less lax, often long, rarely dense. Perianth-segments 7-10 (-12) mm. long, minutely and more or less densely appressed-pubescent. Follicles (6-) 7-10 mm. long, $2\frac{1}{2}$ -3 $\frac{1}{2}$ (-4) times as long as wide, appressed-pubescent (rarely glabrous). Fl. 5-9.

Fields and uncultivated places. *Malta*: common (S. & C.G.; Borg; G. Lanfranco; Gauci); Wolseley). *Gozo*: (Gulia; Borg).

W. Mediterranean region.

2. *D. staphisagria* L.

Zerrighet il-qamel
Short-spurred Larkspur

Stems 30-100 cm. high, stout, simple, patent-hairy. Leaves palmately 5- to 7-lobed, pubescent on both surfaces with mixed very short and longer hairs; segments entire or 3-lobed, with ovate-lanceolate, or oblong, acute lobes. Flowers deep blue. Perianth-segments 13-20 mm. long. Limb of lateral honey-leaves gradually narrowed into claw. Follicles 8-11 mm. wide, inflated. Fl. 4-5.

Valleys. *Malta*: rare (G. Lanfranco) as at Ta' Baldu, Wied Babu (S. & C.G.; Borg); Marsaskala, Wied Qirda (GD.; Borg); Buskett, Grgenti (Borg).

Mediterranean region; Canaries.

3. *Consolida* (DC.) S.F. Gray

Like *Delphinium* but always annual; the 2 upper honey-leaves coalescent into a single structure (nectary), with a single spur; lateral honey-leaves absent; stamens in 5 spirally arranged series; carpel 1.

1. *C. ambigua* (L.) P.W. Ball & Heywood
Delphinium ajacis auct.

Pedidawet
Larkspur

Stem up to 100 cm. high, simple or branched. Basal leaves with oblong segments; cauline with linear segments. Inflorescence usually racemose, occasionally paniculate; lower bracts dissected; bracteoles small, remote, usually not reaching base of flower. Lower pedicels mostly more than 12 mm. long in fruit, but less than twice as long as ripe follicle. Perianth-segments 10-14 (-20) mm. long, usually deep blue; spur 13-18 mm. long. Nectary 3-lobed, with bifid upper lobe. Follicle 15-20 x 5 mm., pubescent, gradually narrowed at apex; seeds black. Fl. 4-6.

Cultivated and often naturalized. *Malta*: glacis of the forts at Floriana (S. & C.G.); Marsaskala, Wied Qirda (GD.; Borg); Buskett, Grgenti (Borg).

Mediterranean region; locally naturalized elsewhere.

4. *Anemone* L.

Perennial herbs. Flowering stems with a whorl of 3(4), often partially united leaves. Flowers conspicuous, usually solitary. Perianth-segments 5-14, petaloid, imbricate. Honey-leaves absent. Stamens numerous. Achenes numerous; style not elongated or feathery.

Cauline leaves much divided; perianth segments 5-8

1. *coronaria*

Cauline leaves undivided or almost so; perianth segments 12-19

2. *hortensis*

1. *A. coronaria* L.

Plate IX

Kahwiela
Poppy Anemone

15-45 cm. high. Basal leaves biternate, segments deeply lobed. Cauline leaves deeply cut into narrow divisions. Flowers 3.5-6.5 cm. in diameter, solitary, red, blue or white. Perianth-segments 5-8, elliptic. Anthers blue. Fl. 1-3.

In cultivated fields and waste places. *Malta*: common (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Gozo*: towards Caccia (S. & C.G.); Xaghra, Nadur, Chambray, Marsalforn, Dabrani (Borg). *Comino*: (S. & C.G.); Qala Santa Marija (Borg).

Mediterranean region.

2. *A. hortensis* L.

Anemoni
Broad-leaved Anemone

Like *A. coronaria*, but lowest leaves less divided (or only lobed) with broader segments; cauline leaves linear-lanceolate, usually undivided; perianth-segments 12-19 (usually 15) narrowly elliptic, patent, pale purplish. Fl. 1-3.

On the sides of the valleys. *Malta*: rare. Wied Babu, Wied Xkora and Wied Ghomor (S. & C.G.; Borg); Grgenti, Ghajn il-Kbira, Buskett (Borg); Wied Inčita (Penza).

C. Mediterranean region.

5. *Clematis* L.

Woody climbers or perennial herbs. Leaves opposite, simple, ternate or 1- to 2-pinnate. Perianth-segments 4 (rarely 5, 6 or 8), petaloid, valvate. Honey-leaves

absent; petaloid staminodes sometimes present. Stamens numerous. Achenes numerous; style persistent, often long and plumose.

Flowers about 2 cm. in diameter; perianth segments hairy on both surfaces

1. *vitalba*

Flowers 4-7 cm in diameter, perianth segments hairy only beneath

2. *cirrha*

1. *C. vitalba* L.

Traveller's-joy; Old Man's Beard

A deciduous woody climber up to 30 cm. high. Leaves 1-pinnate; leaflets ovate, rarely linear-lanceolate, dentate or subentire. Flowers c. 2 cm. in diameter, fragrant. Perianth-segments obtuse, greenish-white, pubescent on both surfaces. Anthers 1-2 mm. long. Receptacle pubescent. Achenes scarcely compressed.

Cultivated in gardens and sometimes escaping (Borg).

S., W. & C. Europe; N. Africa; Caucasus.

2. *C. cirrhosa* L.

Plate IX

Kiesha jew Bajda
Evergreen Traveller's-joy

Evergreen climber up to 4 m. high. Leaves 2.5-5 cm. long, usually simple, dentate or 3-lobed, sometimes 1- to 2-ternate with dentate or lobed leaflets, var. *balearica* (Rich. & Juss.) Rouy & Fouc. Flowers 4-7 cm. in diameter; pedicels 2-5 cm. long. Perianth-segments yellowish-white, sometimes with red spots, ovate, pubescent beneath. Fl. 10-11.

Valleys, sheltered rdum areas, rocks and old walls, often climbing on shrubs and small trees. *Malta*: Fawwara (S. & C.G.; Borg); Wied Inčita, Wied il-Ghasel, Wied iz-Zurriq, Mtaħleb, Wied Gerżuma, Wardija, San Martin, Mellieħa, Busket, Bahrija, Ghajn il-Kbira, Gnien il-Kbir (Borg), also at Tal-Virtù, Mtarfa and elsewhere (Wolseley). *Gozo*: rather rare, Wied il-Lunzjata, Ġigantija (S. & C.G.; Borg), San Blas, Pergla (Borg; Wolseley).

Mediterranean region.

6. *Adonis* L.

Herbs with 1- to 3-pinnate leaves with more or less linear segments. Sepals 5 (-8), often somewhat petaloid; petals 3-20, glossy; nectaries absent. Stamens numerous. Achenes numerous, rugose, forming an elongated head at maturity.

Petals bright scarlet with a dark basal spot; inner margin of achene almost straight, without a projection

1. *annua*

Petals, usually yellow; inner margin of achene with a rounded or angular projection

2. *microcarpa*

1. *A. annua* L.

Plate IX

Għallet is-serduq,
Għajn is-serduq, Henna
Pheasant's-eye

10-40 cm. high. Leaves 3-pinnate, segments linear, mucronate. Flowers 15-25 mm. in diameter. Sepals glabrous, ovate, patent. Petals 5-8, suberect, concave, oblong, somewhat longer than sepals, bright scarlet with a dark basal spot. Achenes 3.5-5 mm. long, the inner margin nearly straight, the outer curved; beak straight. Fl. 1-5.

Fields, cultivated places and soil pockets on waste ground. *Malta* and *Gozo*: common (S. & C.G.; Borg; Wolseley). *Comino*: frequent (Borg; S. & C.G.).

Mediterranean region north to S. Switzerland; Caucasus.

Small Pheasant's-eye

1. *A. microcarpa* DC.

A. annua var. *microcarpa* (DC.) Borg et var. *intermedia* auct.

Like *A. annua* but petals usually yellow and achenes 2-4 mm. long, with or without a transverse ridge; upper projection from inner edge of achene close to beak. Fl. 1-5.

Fields and waste places. *Malta* and *Gozo*: frequent (Borg; G. Lanfranco; Wolseley). Europe.

7. *Ranunculus* L.

Annual or perennial herbs, sometimes aquatic. Flowers solitary or in cymose panicles. Perianth-segments (sepals) (3) 5 (7). Honey-leaves (0-) 5 (-12), petaloid, yellow, white or reddish. Achenes numerous, usually with a persistent glabrous style.

Flowers white

Flowers yellow

Petals usually less than 5 mm. long; stamens 5-15

Petals usually more than 6 mm. long; stamens 12-numerous

Achenes 1-1.4 mm. long, numerous (40-100), glabrous, membranous-winged

Achenes exceeding 2 mm. long, rarely more than 40, more or less pubescent (at least while immature), not winged

Aerial leaves (including the cauline) entire, serrate crenate or dentate, but not lobed
At least some of the aerial leaves distinctly lobed or even more deeply divided

Sepals 3

Sepals 5

Leaves mostly crowded in a horizontal rosette, cauline small and few or absent
Leaves mostly cauline

Achenes granulate or tuberculate
Achenes smooth

Roots of 2 kinds, some fibrous, some fleshy, forming fusiform to ovoid tubers
Roots all fibrous, fibres sometimes thick, but not obviously tuberos

14. *trichophyllus*

12. *baudotii*

13. *peltatus*

8. *ficaria*

9. *bulbatus*

10. *ophioglossifolius*

11. *fontanus*

7. *paludosus*

9. Achenes smooth, punctulate or with few small tubercles
Achenes distinctly spiny or muricate with either numerous or long projections

10. Flowers 25-30 mm. in diameter; achenes about 4 mm. long, beak about 1 mm. long
Flowers 12-25 mm. in diameter; achenes 2.5-3 mm. long, beak about 0.5 mm. long
1. *macrophyllus*
2. *sardous*

11. Achenes about 3 mm. long
Achenes about 7 mm. long

12. Receptacle pubescent
Receptacle glabrous
3. *trilobus*
6. *chius*

13. Sepals deflexed; leaves shallowly lobed
Sepals patent; leaves except the lowest, deeply lobed
4. *muricatus*
5. *arvensis*

1. *R. macrophyllus* Desf.

Largo-leaved Buttercup

Robust pubescent perennial 30-60 cm. high. Stock stout, erect, surrounded by fibres. Basal leaves about 4-7 x 5-10 cm., pentagonal-orbicular, deeply cordate, 3- to 5-partite; segments wide, irregularly incised and crenate-dentate; upper cauline leaves 3-fid with entire segments, or undivided. Flowers 25-30 mm. in diameter. Achenes 4 mm. long, compressed, bordered, smooth, minutely pitted, or with scattered bulbous-based hairs; beak about 1 mm. long, stout, more or less curved. Fl. 4-5.

Along springs. *Malta*: rather frequent (G. Lanfranco; Wolseley); abundant in some valleys as at Wied Inčita, Girgenti and Mtaħleb (S. & C.G.; Borg).

W. Mediterranean region.

2. *R. sardous* Crantz

Hairy Buttercup

A more or less pubescent annual 10-45 cm. high, with the corm-like stock not or feebly developed. Flowers 12-55 mm. in diameter. Honey-leaves pale yellow. Achenes 2.5-3 mm. long, minutely punctate, with small, obtuse tubercles near the margin, or sometimes smooth; beak c. 0.5 mm. long, upward curving. $2n = 16$. Fl. 2-6.

Malta: very rare (G. Lanfranco) in the ditches at Floriana (S. & C.G.; Borg).

Most of Europe; N. Africa; W. Asia.

3. *R. trilobus* Desf.

Three-lobed Buttercup

Nearly glabrous annual. Lowest leaves simple; the next 3-partite; segments simple, cuneate-obovate, dentate, upper with more numerous linear-oblong lobes. Flowers 10-15 mm. in diameter. Honey-leaves about as long as sepals. Achenes about 2 mm. long, with numerous small tubercles; beak short, triangular. Fl. 3-4.

Damp places. *Malta*: rare (G. Lanfranco), as at Marsa (GD.; Galla; S. & C.G.) near Floriana glaciis (Borg). *Gozo*: rare, Wied il-Lunzjata (S. & C.G.).

S.W. Europe.

4. *R. muricatus* L.

Scilly Buttercup

Glabrescent annual up to about 50 cm. high. Leaves all similar, coarsely crenate-dentate and often shallowly lobed. Honey-leaves little longer than sepals. Receptacle pubescent. Achenes 7-8 mm. long, ovate, spiny with a broad smooth margin; beak 2-3 mm. long, nearly straight. $2n = 48, 64$. Fl. 2-5.

Damp places in cultivated areas, and in valleys. *Malta* and *Gozo*: common particularly in the bottom of humid ravines (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Comino*: (Borg).

Mediterranean region; Canaries; Asia east to India.

5. *R. arvensis* L.

Corn Buttercup

More or less pubescent annual 15-60 cm. high. Lowest leaves simple; the others 3-lobed and often again divided into narrow, entire or dentate segments. Pedicel terete. Flowers 4-12 mm. in diameter, pale greenish-yellow. Sepals patent. Receptacle pubescent. Achenes 6-8 mm. long, few (4-8), in 1 whorl, spiny or tuberculate, rarely only ribbed-reticulate, with a broad sulcate border; beak 3-4 mm. long, straight. $2n = 32$. Fl. 4-5.

Cultivated and waste ground especially on clayey soil. *Malta*: frequent, but not common (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Gozo*: Nadur (S. & C.G.; Borg); Xaghra (Borg).

S. W. & C. Europe; N. Africa; W. Asia to India.

6. *R. chius* DC.

Eastern Buttercup

Pubescent, spreading to decumbent annual 10-40 cm. high. Leaves 3-lobed; middle segment entire to 3 (-5)-dentate. Flowers 3-6 mm. in diameter. Sepals deflexed. Receptacle glabrous. Fruiting pedicel greatly thickened. Achenes about 3 mm. long, bordered with hooked spines; beak at least half as long as the achene. Fl. 3-4.

Damp places. *Malta*: Ghajn Rihana (GD.; Borg). No herbarium specimen.

Balkan peninsula, Italy, Krym and the Mediterranean islands.

7. *R. paludosus* Poirlet

Jersey Buttercup

R. flabellatus Desf.

A very variable pubescent perennial up to about 50 cm. high, with fusiform tubers. Stock usually stout and fibrous. Outer basal leaves shallowly 3-lobed; inner 3-fid; middle segment long-stipitate; all divided into narrow dentate segments. Receptacle glabrous. Achenes about 2 mm. long, minutely punctate, sparsely pubescent, strongly keeled on back, tapering into a nearly straight beak about as long as the achene and hooked at tip. $2n = 32$. Fl. 3-5.

In arid, rocky places. *Malta* and *Gozo*: frequent (S. & C.G.; Borg; G. Lanfranco).

Mediterranean region; W. Europe northwards to the Channel Islands; east to India.

8. *R. ficaria* L.

Fomm il-ghasli
Lesser Celandine

Perennial 5-30 cm. high. Some roots fibrous, some forming fusiform tubers. Leaves broadly ovate, cordate, obtusely angled, shallowly crenate or rarely dentate. Flowers 15-50 mm. in diameter. Receptacle pubescent. Sepals 3. Honey-leaves 8-12, ovate. Achenes 2.5 mm. long, ovoid, keeled, pubescent; beak minute. Fl. 1-4.

Two subspecies appear to occur. Subsp. *ficaria* is a less robust plant with flowers 20-30 mm. in diameter and has puberulent achenes. $2n = 16$. Subsp. *ficariformis* Rouy & Fouc. (*R. ficaria*) var. *grandiflorus* Strob.) is a much more robust plant with flowers 30-50 mm. in diameter and has pubescent achenes.

In fields, and especially in moist valleys. *Malta* and *Gozo*: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Europe; W. Asia; introduced in N. America.

9. *R. bullatus* L.

Plate IX

Cifollog

Autumn Buttercup

Perennial. Leaves ovate, crenate, hispid beneath, more or less bullate. Pedicels 5-20 cm. long, pubescent, 1-2 flowered. Flowers c. 25 mm. in diameter, soon yellow. Sepals greenish, pubescent. Honey-leaves 5-12, oblong, yellow. Receptacle glabrous. Achenes narrowly bordered; beak short, curved. Fl. 10-2.

Everywhere, especially in uncultivated, arid places. *Malta*, *Gozo* and *Comino*: very common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region to N.W. Spain and Portugal; N. Africa.

10. *R. ophioglossifolius* Vill.

Adders-tongue Spearwort

Annual 10-40 cm. high. Basal leaves ovate or suborbicular, cordate, long petiolate; upper smaller, narrower, shortly petiolate or sessile; all entire or obscurely serrate; lower pedicels as long as leaves. Flowers 5-9 mm. in diameter, numerous; pedicel somewhat sulcate, appressed-pubescent. Sepals glabrous. Honey-leaves obovate, nearly twice as long as sepals. Achenes c. 1.5 mm. long, compressed, minutely tubercled; beak about 1/10 as long as achene. $2n = 16$. Fl. 3-4.

In ponds. *Malta*: rare (G. Lanfranco), as at Ghajn Rihana, Ghajn Mula (S. & C.G.; Borg; Penza).

S. Europe; isolated localities in Gotland and England; Mediterranean region; Canaries; Caucasus.

11. *R. fontanus* C. Presl

Like *R. ophioglossifolius* but smaller and more or less procumbent; pedicels glabrous; flowers smaller; achenes smooth; beak longer. Fl. 3-4.

Malta: very rare in ponds at Ghajn Mula (Borg).

Corse; S. Italy; Sicilia; Jugoslavia; Albania.

12. *R. baudotii* Godron

Brackish Water-crowfoot

R. aquatilis var. *baudotii* (Godron) Fiori

An annual or perennial with either laminate or capillary leaves, or both. Laminate leaves with 3, deep, cuneate, distant, entire or crenate segments. Capillary leaves robust, not collapsing when removed from water. Honey-leaves usually more than 6 mm. long, contiguous. Stamens 12-numerous. Receptacle ovoid, pubescent. Achenes 1-1.4 mm. long, numerous (40-100), glabrous, distinctly membranous-winged. $2n = 32$. Fl. 1-6.

Ponds, especially in rocky ground. *Malta*, *Gozo* and *Comino*: common (Borg; G. Lanfranco; Wolseley).

In brackish water on most coasts of Europe; N.W. Africa.

13. *R. peltatus* Schrank

Peltate-leaved Crowfoot

R. aquatilis var. *peltatus* (Schrank) Koch

An annual or perennial with either laminate or capillary leaves, or both. Laminate leaves semi-orbicular with a truncate base, to orbicular, with 3-7, shallow, usually crenate segments. Capillary leaves shorter than the internodes. Pedicel in fruit usually more than 50 mm. and exceeding the petiole of the subtending leaf. Honey leaves usually more than 10 mm. long, contiguous; nectaries more or less pyriform. Stamens 12-numerous. Achenes more than 2 mm. long, not usually more than 40, more or less pubescent, ovate. $2n = 32$. Fl. 1-6.

Ponds. *Malta*: frequent (Borg).

Most of Europe; N. Africa.

(*R. aquatilis* L. which differs from *R. peltatus* in the segments of the laminate leaves having dentate margins; the pedicel in fruit being rarely more than 50 cm. long and usually shorter than the petiole of the subtending leaf, in the honey leaves being up to 10 mm. long and the nectaries circular, does not seem to be definitely recorded from *Malta*).

14. *R. trichophyllus* Chaix

Thread-leaved water-crowfoot

An annual or perennial without laminate leaves. Capillary leaves rarely more than 4 cm. long. Honey-leaves rarely more than 5 mm. long, not contiguous. Stamens 5-15. Achenes more than 2 mm. long, ovate. $2n = 32$. Fl. 1-5.

In springs, ponds and ditches. *Malta* and *Gozo*: frequent (G. Lanfranco; Wolseley), as at Wied il-Ghasel, Ghajn Rihana, Wied is-Sewda and Qlegha (Borg).

Most of Europe; N. Africa; Asia; central N. America.

XXIX LAURACEAE

Trees or shrubs. Leaves evergreen, entire, gland-dotted, alternate. Dioecious, or flowers hermaphrodite or polygamous; flowers actinomorphic, small, greenish. Perianth deeply 4 to 6-lobed. Stamens usually in 4 whorls, anthers opening by valves. Ovary superior, 1-celled; style simple. Fruit a berry.

1. Laurus L.

Diocious. Inflorescence subsessile. Perianth 4-lobed; stamens 8-12; anthers all introrse, opening by 2 valves.

1. *L. nobilis* L.

Plate IX

Rand
Laurel

Shrub or small tree 2-20 m high, with slender glabrous twigs. Leaves 5-10 x 2.4 (-7.5) cm, narrowly oblong-lanceolate, acute or acuminate, glabrous. Male flowers with 8-12 stamens; all or most with 2 glands at base; anthers opening by 2 valves. Female flowers with 2-4 staminodes. Fruit 10-15 mm long, ovoid, black when ripe. $2n = 42$, Fl. 2-4.

Malta and *Gozo*: commonly cultivated and often naturalised (S. & C.G.; Borg; G. Lanfranco; Wolseley). Possibly native; *Malta*: Buskett Wardija, Ta' Baldu. (Borg; Wolseley); *Ghajn il-Kbira*, San Martin, Gnejna, Addolorata Cemetery. (Borg). *Gozo*: Xlendi, Nadur (Borg).

Mediterranean region; cultivated elsewhere and naturalized in places.

RHOEDALES

XXX. PAPAVERACEAE

Herbs with latex or watery sap. Leaves usually spirally arranged, variously dissected. Flowers hermaphrodite, actinomorphic or zygomorphic, hypogynous. Sepals 2(-3), caducous. Petals 4-6. Stamens 2, 4 or numerous, whorled. Ovary superior, unilocular, bilocular or imperfectly multilocular; carpels 2 to many.

1. Flowers zygomorphic
Flowers actinomorphic

2. Flowers weakly zygomorphic; petals not
Flowers strongly zygomorphic; upper petal spurred

3. Capsule less than 10 times as long as wide, narrowed at base
Capsule more than 10 times as long as wide, more or less parallel-sided

4. Flowers solitary; petals 20 mm long or more; capsule 2-locular
Flowers in a simple umbel; petals up to 10 mm long; capsule 1-locular

4. *Hypecoum*
5. *Fumaria*

1. *Papaver*

2. *Glaucium*

3. *Chelidonium*

Subfam. Papaveroideae

Latex usually present. Flowers solitary or umbellate, actinomorphic. Sepals entire; petals entire, not spurred. Stamens numerous. Capsule dehiscent by pores or longitudinal valves.

1. Papaver L.

Herbs with latex. Sepals 2, free, caducous. Petals 4, entire, often bright red, crumpled in bud, usually caducous. Stigmas 4-15, sessile over the placentae. Capsule subcylindrical to globose, opening by pores below the stigmatic disc. Aril absent.

1. Plant glaucous; leaves lobed, rarely pinnatisect, upper amplexicaul

Plant not or only slightly glaucous; leaves usually deeply divided to pinnatisect, upper not amplexicaul

2. Capsule setose
Capsule glabrous

3. Capsule subglobose to broadly obovoid, less than twice as long as wide

Capsule clavate to oblong-elliptical, at least twice as long as wide.

4. Anthers violet
Anthers yellow or yellow-brown

1. *P. somniferum* L.

1. *somniferum*

2.

5. *hybridum*

3.

2. *rhoeas*

4.

3. *dubium*

4. *pinnatifidum*

Kahxieh
Opium Poppy

Erect glaucous annual 30-100 (-150) cm high. Leaves 7-12 cm long, ovate-oblong, pinnately lobed; lower leaves with short petiole, upper amplexicaul. Petals 3-4.5 mm long, suborbicular, white to purple, with dark spot at base. Filaments clavate, white; anthers pale yellow. Capsule 5-9 x 3-6 cm, glabrous. Margin of stigmatic disc deeply lobed; stigmatic rays 5-12 (-18), not reaching edge of lobes. Fl. 2-5.

Two subspecies occur. Subsp. *somniferum* (var. *hortense* Hussenot) is subglabrous, glaucous, up to 100 (-150) cm high; leaves more or less pinnately lobed, basal attenuate into petiole; capsule up to 90 x 60 mm, ovoid to subglobose; lobes of stigmatic disc sulcate, with dentate margin and truncate apex. Very variable in shape and colour of petals, colour of seeds and shape and size of capsule. Subsp. *retigerum* (DC.) Corb. differs in being more or less setulose; stems up to 60 cm high; leaves more deeply and acutely lobed, lobes often with an apical seta; capsule 50-60 x 30-40 mm, subglobose to obovoid.

Cultivated fields and waste places. *Malta* and *Gozo*: frequent (S. & C.G.; G.D.; Gulia; Borg; G. Lanfranco; Wolseley).

Cultivated since ancient times in most of Europe, except the extreme north, and W. Asia, for its medicinal and narcotic latex and its seeds, which are used as a condiment and a source of oil, and more recently grown in gardens for ornament; widespread as a naturalized alien or casual, and probably native in the W. & C. Mediterranean region.

2. *P. rhoeas* L.

Plate X

Pepprin
Common Poppy

Patent hispid annual 25-90 cm high. Leaves 3-15 cm long, 1- to 2-pinnate; lower petiolate, upper sessile; segments coarsely dentate, acuminate, terminal usually

larger than laterals. Pedicel patent-hispid. Petals 30-45 mm long, orbicular, usually red, sometimes with dark spot at base. Filaments filiform, purple, anthers bluish. Capsule 1-2 cm long, subglobose or broadly obovoid, rounded at base, slightly ribbed, glabrous. Stigmatic disc more or less flat; rays (5-) 8-12 (-18). $2n = 14$. Fl. 3-5.

Cultivated, and sometimes waste places. *Malta*, *Gozo* and *Comino*: very common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Throughout most of Europe as a weed of cultivation and native at least in the south; casual in the north; N. Africa; temperate Asia.

3. *P. dubium* L.

Pepprin

Papaver rhoeas var. *dubium* (L.) Fiori and var. *obtusifolium* (Desf.) Fiori

Long-headed Poppy

Hispid annual 20-60 cm high; hairs patent in lower parts, appressed above. Root and latex white. Leaves somewhat glaucous; basal pinnatisect or pinnatifid; segments ovate, obtuse; cauline often bipinnatifid, segments linear-lanceolate, acute. Pedicel appressed-hispid. Petals 15-30 (-35) mm long, suborbicular, red, sometimes with dark spot at base. Filaments filiform, purple; anthers violet, usually below the stigmatic disc. Capsule 1.5-2 x 0.5-0.75 cm, obvoid, frequently ribbed, glabrous. Stigmatic disc more or less flat; rays 7-9. $2n = 42$. Fl. 3-5.

In cultivated places. *Malta* and *Gozo*: common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Throughout most of Europe as a weed of cultivation, but only as a casual in parts of the north.

4. *P. pinnatifidum* Moris

Pepprin

P. rhoeas var. *pinnatifidum* (Moris) Fiori

Mediterranean Poppy

Erect hispid annual 50-60 cm high. Leaves usually pinnatifid, lower petiolate; upper sessile; segments triangular-ovate, entire or dentate. Pedicel appressed-hispid above, patent-hispid below. Petals 20-25 mm long. Filaments filiform, dark violet; anthers yellow. Capsule c. 2 x 0.5-0.7 cm, oblong-obconic, slightly tapered towards base, ribbed, glabrous. Stigmatic disc slightly convex, not wider than capsule; rays 6-8. Fl. 1-3.

Especially in cultivated places. *Malta* and *Gozo*: common (S. & C.G.; Borg; G. Lanfranco).

Mediterranean region, extending to Bulgaria and Portugal.

5. *P. hybridum* L.

Pepprin

Rough Poppy

Hispid annual 10-50 cm high. Leaves hispid, 1- to 2-pinnatisect; segments linear, to oblong-lanceolate, often aristate; lower petiolate, upper sessile. Pedicel densely appressed-hispid, less so above. Petals 10-20 (-25) mm long, obovate, red with dark spot at base. Filaments clavate, dark violet; anthers pale blue. Capsule 1-1.25 cm, obovoid-globose, ribbed, with stiff erect setae. Stigmatic disc convex, rays 4-8. $2n = 14$. Fl. 1-5.

In cultivated and waste places. *Malta* and *Gozo*: common (S. & C.G.; Borg; Wolseley).

Native in S. Europe and widespread as a weed of cultivation further north; C. Asia.

2. *Glaucium* Miller

Glaucous; latex yellow. Sepals free. Petals 4, entire. Stigma 2-lobed sessile over placenta. Capsule linear, 2-celled, opening from above almost to base by 2 valves. Seeds embedded in septum. Aril absent.

1. *G. flavum* Crantz

Plate X

Pepprin isfar

Yellow Horned-poppy

Sparsely pubescent biennial or perennial. Stems 30-90 cm high. Basal leaves 15-35 cm long, lyrate, pinnately lobed; lower segments smaller and more or less entire, upper coarsely dentate; cauline leaves smaller, ovate, lobed, amplexicaul. Flowers solitary, terminal or axillary. Sepals more or less pubescent. Petals 3-4 cm long, yellow, broadly obovate. Stamens yellow. Ovary tuberculate throughout its length. Capsule 15-30 cm long, often curved, glabrous, not constricted between the seeds. $2n = 12$. Fl. 4-7, also in autumn.

Rocky and sandy places near the sea. *Malta*: common, particularly along the north and east coasts (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Gozo*: Dwejra, Ramla, Xlendi, Mgarr (S. & C.G.; Gulia; Borg; Wolseley). *Comino*: frequent (Gulia; Borg; Wolseley).

Coasts of S. & W. Europe, northwards to Oslo; Black Sea; frequently naturalized in C. Europe; W. Asia.

3. *Chelidonium* L.

Latex orange. Sepals free. Petals 4, entire. Stigma 2-lobed; style very short. Capsule linear, without septum, opening from below by 2 valves. Aril crested.

1. *C. majus* L.

Plate X

Haxixa tal-felul

Greater Celandine

Glaucous, sparsely pubescent perennial. Stems 30-90 cm high. Leaves pinnate; leaflets 5-7, ovate to oblong, terminal usually 3-lobed, lateral often with a stipule-like lobe at base on lower side, all crenate. Inflorescence umbellate; flowers 2-6. Petals up to 1 cm long, obovate; bright yellow. Stamens yellow; filaments expanded above. Capsule 3-5 cm, more or less straight, glabrous; aril white. $2n = 12$. Fl. 4-6.

Old walls. *Malta*: local (G. Lanfranco), as at San Anton, Argotti (S. & C.G.; Borg; Buskott (Gulia; Borg); Floriana Gardene, Kordin (Borg). *Gozo*: Chambray (Gulia; Borg); Rabat (Borg).

Europe, except the extreme north, but in some districts only as an escape from gardens; N. Asia.

Subfam. Hypecooidene

Flowers solitary or in cymes. Corolla slightly zygomorphic; petals not spurred. Capsule linear.

4. *Hypecoum* L.

Glabrous, glaucous annuals with watery sap. Sepals free. Petals 2, at least the inner pair 3-lobed. Stamens 4. Stigmas 2; style short. Capsule ribbed or lobed, usually breaking up into 1-seeded portions. Aril absent.

1. *H. procumbens* L.

Plate X

Qarn il-moghħza
Sickle-fruited Hypecoum

Stem striate, procumbent. Leaves 2-pinnatisect, glaucous; lobes linear to lanceolate. Inflorescence cymose; flowers 0.5-1.5 cm in diameter. Sepals ovate or ovate-lanceolate, acute, much shorter than petals, deciduous. Petals yellow, the outer 3-lobed, almost as wide as long, with the lateral lobes much smaller than the middle one; the inner petals deeply trifold with suborbicular, ciliate middle lobe. Anthers 1-1.2 mm long. Fruit 4-6 cm long, arcuate, erect, jointed. Fl. 1-4. Cultivated and waste places, especially near the sea. *Malta*: not frequent (S. & C.G.; Borg; G. Lanfranco). *Gozo*: Qala Dwejra, Marsalforn (S. & C.G.; Borg); Qbajjar (Borg).

Mediterranean region and Asia.

Subfam. Fumarioideae

Usually glabrous herbs with watery sap. Inflorescence racemose, bracteolate. Corolla transversely zygomorphic. Upper exterior petal spurred or succate. Stamens 2, tripartite.

5. *Fumaria* L.

Annuals with long stems, erect, diffuse or climbing. Leaves cauline, 2- to 4-pinnatisect. Inflorescence racemose, bracteate, with short pedicels. Sepals 2, lateral. Corolla at least 5 mm long, usually larger, zygomorphic, consisting of a spurred upper petal, 2 inner petals, and a lower one. Fruit 1-seeded, indehiscent; when dry showing 2 apical pits due to clefts in the mesocarp.

1. Corolla at least 9 mm long; wings of the upper petal turned upwards
Corolla not more than 9 mm long; wings of the upper petal less turned upwards
2. Fruit smooth when dry
Fruit rugose when dry
3. Corolla creamy-white, sometimes deep red; sepals 4-6 x 2-3 mm
Corolla pale pink; sepals 2-3 x 1-2 mm
4. Pedicels arcuate-recurved in fruit
Pedicels erect or patent
5. Corolla white or pinkish-white; fruit c. 3 x 2.5-3 mm with a sub-emarginate beak
Corolla pink; fruit 2.5-3 x 2-3 mm, obtuse to very slightly beaked
6. Sepals 3-4 x c. 2 mm
Sepals 2-3 x 1-2 mm
7. Raceme 8- to 12-flowered; sepals 2-2.5 x c. 1 mm; fruit 2-2.5 x 1.5-1.7 mm
Raceme 15- to 25-flowered; sepals 2-3 x 1-2 mm; fruit 2-2.5 x 2-2.5 mm

3. *capreolata*
6. *bastardii*
4. *flabellata*

1. *agraria*

2. *gaillardotii*

5. *bicolor*

6. *bastardii*

8. Sepals 1.5-3.5 x 1-3 mm
Sepals 0.7-1 x 0.3-0.5 mm

9. Bracts longer than fruiting pedicels; fruit subglobose
Bracts shorter than fruiting pedicels; fruit nearly obreniform in profile

10. Bracts shorter than pedicels; flowers pink
Bracts equalling or longer than pedicels; flowers usually white

7. *densiflora*
8. *officinalis*
9. *vallantii*
10. *parviflora*

1. *F. agraria* Lag.

Dahnet 1-art
Field Fumitory

Raceme 15- to 22-flowered, longer than the peduncle. Bracts about 2/3 as long to as long as the patent fruiting pedicels. Sepals 3.5-5 x 1-2 mm, dentate to subentire. Corolla 12-14 mm long, pinkish-white only the inner petals with dark purple apices; lower petal with patent margin. Fruit c. 3 x 2.5 mm, ovoid, strongly keeled and rugose when dry, apex with an emarginate beak. Fl. 12-5.

Cultivated and waste places. *Malta* and *Gozo*: common (S. & C.G.; Borg; G. Lanfranco). It seems unlikely that this species, if it occurs, is common, as no specimens have been seen, but it certainly occurs in Sicily.

Mediterranean region from Yugoslavia westwards.

2. *F. gaillardotii* Boiss.
F. agraria var. *major* sensu Borg

Plate X

Dahnet 1-art
Italian Fumitory

Racemes 10- to 15 (-20)-flowered, the upper ones very often shorter than the peduncle. Bracts more or less equalling the suberect fruiting pedicels. Sepals 3-4 x c. 2 mm, irregularly incise-dentate. Corolla 10-12 (-13) mm long, pale pink; apex of inner petals and wings of upper one dark purple; lower petals with broad patent margin. Fruit 2.5-3 x 2.5-3 mm, subglobose-quadrate, apex very obtuse or subtruncate, slightly keeled, densely tuberculate-rugose when dry.

Cultivated and waste places. *Malta* and *Gozo*: common (Borg; Sell; Wolseley).

E. Mediterranean region.

3. *F. capreolata* L. subsp. *capreolata*

Dahnet 1-art
White Ramping-fumitory

Raceme up to 20-flowered, shorter than the peduncle. Bracts usually shorter than the fruiting pedicels which are often rigidly arcuate-recurved. Sepals 4-6 x 2-3 mm, more or less dentate. Corolla 10-14 mm long, creamy-white or pinkish, rarely deep red (var. *speciosa* Hamm.); wings of upper petal and apex of inner petals blackish-red; lower petal with very narrow, erect margin. Fruit 2 x 2 mm, smooth, subglobose, apex very obtuse, but not truncate, obscurely keeled. Fl. 12-3.

Cultivated places. *Malta* and *Gozo*: infrequent (G.D.; Cleghorn; Duthie; G. Lanfranco).

S. W. & C. Europe; N. Africa; introduced in N. and S. America.

4. *F. flabellata* Gaspar.

Southern Ramping Fumitory

Like *F. capreolata* but raceme 10- to 30-flowered, at first as long as, then longer than, the peduncle; sepals 3-5 x 1.5-2.5 mm; lower petal with patent margin; fruit 2-2.75 x 2-2.75 mm, densely tuberculate-rugose when dry. Fl. 2-3.

Cultivated and waste places. *Malta*, *Gozo* and *Comino*; common (Borg).

Mediterranean region.

5. *F. bicolor* Sommer ex Nicotia

Dahnet 1-art
Two-coloured Fumitory

Raceme 8- to 12-flowered, shorter than the peduncle. Bracts 1/4 - 1/2 as long as the more or less suberect fruiting pedicels. Sepals 2-2.5 x c. 1 mm, more or less dentate. Corolla 10-13 mm long, white or pinkish-white, finally all pink; apex of inner petals dark purple; lower petal with narrow patent margin. Fruit 2-2.25 x 1.5-1.75 mm, subglobose-ovoid, obscurely keeled, rugose when dry; apex subacute. Fl. 2-4.

Open ground away from cultivation. *Malta*: infrequent. Wieb Babu, (Duthie; Borg); Girgenti; (Duthie); Ta' Lawrenti, Gnien il-kbira (Borg). *Gozo*: Dwejra (Duthie; S. & C.G.; Borg).

W. part of Mediterranean region.

6. *F. bastardii* Boreau

Dahnet 1-art
Tall Ramping Fumitory

Raceme usually 15- to 25-flowered, longer than the peduncle. Bracts 1/3 - 1/2 as long as the suberect or erecto-patent fruiting pedicels. Sepals 2-3 x 1-2 mm, more or less serrate. Corolla 9-12 mm long, pale pink with the apex of the inner petals and sometimes the wings of the upper petal dark purple; upper petal narrow and laterally compressed; lower petal with narrow patent margin. Fruit 2-2.5 x 2-2.5 mm, ovoid with a wide, flattish base and more or less obtuse apex, slightly keeled and usually rugose. $2n = c. 48$. Fl. 12-4.

Very variable. Var. *bastardii* has no dark colouration in the tip of the upper petal. Var. *gussonei* (Boiss.) Pugsl. has the upper petal dark-tipped and the fruit with obscure apical pits. Var. *benedicta* (Nicotia) Pugsl. has the upper petal dark tipped and the fruit with black apical pits.

Malta: frequent (Borg). *Gozo*: Xlendi (Borg).

7. *F. densiflora* DC.
F. micrantha Lag.

Dahnet 1-art
Dense-flowered Fumitory

Raceme 20- to 25-flowered, much exceeding the very short or obsolete peduncle. Bracts normally exceeding the erecto-patent fruiting pedicels. Sepals (2-) 2.5-3.5 x (1.5-) 2-3 mm, subentire or laciniate. Corolla 6-7 mm long, pink; wings of upper petal and apex of inner blackish-red; lower petal with patent margin, subspathulate. Fruit 2-2.5 x 2-2.5 mm, subglobose, keeled, rugose when dry; apex rounded-obtuse. Fl. 3-5.

Waste and cultivated places. *Malta*: frequent in many places (S. & C.G.; Borg).

W. & S. Europe; N. Africa and Middle East; sometimes casual elsewhere.

8. *F. officinalis* L.

Dahnet 1-art
Common Fumitory

Raceme longer than the peduncle. Bracts half as long as to nearly as long as the erecto-patent fruiting pedicels. Sepals 1.5-3.5 x 1-1.5 mm, irregularly dentate. Corolla 7-9 mm long, purplish-pink; wings of upper petal and apex of inner ones blackish-red; lower petal with patent margin, spathulate. Fruit c. 2 x 2.5-3 mm, nearly obreniform in profile, obscurely keeled, rugose when dry; apex truncate or slightly emarginate. Fl. 12-7.

Two subspecies occur. Subsp. *officinalis* has the raceme normally more than 20-flowered and sepals 2.5-3.5 x 1-1.5 mm. Subsp. *wirtgenii* (Koch) Arcangelii has the raceme 10- to 20-flowered and sepals 1.5-2 x 1 mm.

Cultivated places. *Malta*, *Gozo* and *Comino*: frequent (S. & C.G.; Borg).

Almost throughout Europe, east to Persia; N. Africa.

9. *F. vaillantii* Loisel.

Dahnet 1-art
Few-flowered Fumitory

Raceme generally 6- to 12-flowered, longer than the short peduncle. Bracts about 3/4 as long as the more or less erect fruiting pedicels. Sepals 0.7-1 x 0.3-0.5 mm, more or less laciniate-dentate. Corolla 5-6 mm long, pale pink; apex of inner petals and wings of upper petal often tinted with blackish-red; lower petal with patent margin, spathulate. Fruit c. 2 x 2 mm, subglobose, obscurely keeled, granular-rugose when dry; apex rounded-obtuse and mucronulate when young. $2n = 32$. Fl. 2-6.

Cultivated places. *Malta*: rather rare as at Attard, Mosta and Birkirkara (Borg).

Mediterranean region; temperate Asia.

10. *F. parviflora* Lam.

Dahnet 1-art
Fine-leaved Fumitory

Like *F. vaillantii* but raceme up to 20-flowered, subsessile; bracts as long as or longer than the fruiting pedicels; sepals 0.7-1 x 0.3-0.5 mm, more or less laciniate-dentate; corolla 5-6 mm long, white, flushed pink; lower petal with patent margin, spathulate; fruit c. 2 x 2 mm, distinctly keeled and often subacute. Fl. 1-5.

Cultivated and waste places. *Malta*: common (S. & C.G.; Borg; G. Lanfranco). *Gozo*: frequent (S. & C.G.; Borg).

Mediterranean region extending northwards to Britain and Belgium; W. Asia; N. Africa.

XXXI. CAPPARIDACEAE

Herbs, shrubs or trees. Leaves simple, or ternate to palmate, alternate, stipulate or not, stipules sometimes spinose. Flowers solitary or in racemes, actinomorphic or more usually zygomorphic, hermaphrodite. Sepals 4. Petals 4. Stamens 6-many. Ovary single, superior, on a gynophore; carpels 2. Fruit a 2-valved, unilocular capsule, or a berry.

1. Capparis L.

Shrubs with simple leaves, and usually with stipular spines. Flowers solitary, showy, zygomorphic; sepals 4, white or pink; stamens numerous. Fruit a berry borne on a long gynophore.

1. *C. spinosa* L. var. *inermis* Turra

Plate X

Kappar
Caper

Branches pendulous. Leaves glabrous, somewhat succulent, petiolate, orbicular or orbicular-ovate, obtuse or emarginate at the apex. Stipular spines absent or caducous at an early stage. Flowers 5-7 cm in diameter, slightly zygomorphic. Sepals purplish. Fl. 4-9.

Rocks, bastions, walls. Malta, Gozo, Comino and Ffilla; common (S. & C.G.; Borg, G. Lanfranco; Wolseley).

Mediterranean region; Portugal; Krym.

XXXII. CRUCIFERAE

Annual to perennial herbs, rarely small shrubs. Leaves alternate, exstipulate. Flowers usually hermaphrodite, actinomorphic, hypogynous. Sepals 4, free, in 2 decussate pairs. Petals 4, rarely absent, free, clawed, imbricate or contorted, alternating with the sepals. Stamens usually 6, rarely 4, 2 or 0, tetradynamous (an outer pair with short filaments, and two inner pairs, one posterior and one anterior, with long filaments); filaments sometimes winged or with a tooth-like appendage. Nectarial glands of various sizes shapes colours and dispositions around the base of the stamens and ovary. Ovary of 2 carpels, syncarpous, with 2 parietal placentas, usually bilocular through the formation of a membranous false septum by the union of outgrowths of the placentas; sometimes transversely plurilocular. Stigma capitate to bilobed. Fruit usually a dehiscent capsule opening by 2 valves from below, called a *siliqua* when at least 3 times as long as wide or a *silicula* if less than 3 times as long as wide; sometimes indehiscent, breaking into 1-seeded portions or not; rarely transversely articulate with dehiscent and indehiscent segments, sometimes dividing at maturity into 1-seeded portions (lomentum). Seeds in 1 or 2 rows in each loculus.

1. Fruit lomentaceous — that is transversely articulate with 2 segments often separating at maturity; the lower segment 2-valved, dehiscent or sterile, the upper segment indehiscent

Fruit a *siliqua* or *silicula*, sometimes dividing into several portions, or hard and indehiscent

2. Upper segment of fruit globose or ovoid, with a short beak

Upper segment of fruit cylindrical or oblong-ovoid, sometimes constricted between the seeds

3. Upper segment of fruit mitre-shaped with a single seed

Upper segment of fruit many-seeded, long and cylindrical; often contracted between the seeds

29. *Raphistrum*

28. *Cakile*

30. *Raphanus*

4. Fruit a *siliqua* at least 3 times as long as wide
Fruit a *silicula* less than 3 times as long as wide
5. Glabrous plant or with unbranched hairs only
Plant with stellate, branched or a mixture of branched and unbranched hairs
6. Sepals erect
Sepals erecto-patent or patent
7. Petals purple
Petals yellow or yellowish-white, sometimes with purple veins
8. Petals yellow or yellowish-white
Petals pale yellow or greenish with dark veins
9. *Siliqua* 4-angled, the valves 1-veined
Siliqua convex, rounded with a prominent median vein
10. Petals 15-20 mm
Petals less than 15 mm
11. Valves of *siliqua* with 3-7 veins
Valves of *siliqua* with single median vein or veinless
12. *Siliqua* 3-veined; not beaked
Siliqua 3-7 veined; beak 10 mm or more long
13. Valves flat; *siliqua* strongly compressed
Valves convex; *siliqua* not strongly compressed
14. Petals white
Petals yellow or white with purple veins
15. Stigma capitate
Stigma deeply 2-lobed, the lobes sometimes erect and connate to form a beak on the *siliqua*
16. Petals yellow
Petals white, pink or violet
17. Lobes of stigma without a swelling or horn
Lobes of stigma with a dorsal swelling or horn

22. *Moricandia*

21. *Conringia*

24. *Brassica*

26. *Eruca*

27. *Hirschfeldia*

1. *Sisymbrium*

25. *Sinapis*

9. *Cardamine*

8. *Nasturtium*

23. *Diplotaxis*

2. *Descurainia*

5. *Cheiranthus*

4. *Malcolmia*

6. *Matthiola*

18. Silicula didymous, flat
Silicula not didymous (or rarely didymous and then not flat)
19. Silicula with 4 longitudinal irregularly dentate wings
Silicula without wings
20. Silicula latiseptate (compressed parallel to the septum which is therefore as wide as the widest diameter of the fruit), rarely nucumetaceous
Silicula angustiseptate (compressed at right angles to the septum)
21. Sepals erect (calyx closed)
Sepals patent or erecto-patent
22. Robust plants up to 1 m with fusiform roots
Dwarf plants up to 40 cm without fusiform roots
23. Petals entire or emarginate
Petals deeply 2-lobed
24. Fruit didymous, reniform or cordate
Fruit not didymous, reniform or cordate, but sometimes obcordate
25. Cauline leaves sessile, amplexicaul; petals c. 4 mm long
Cauline shortly petiolate; petals 0.5-1.5 mm long
26. Valves of fruit winged
Valves of fruit not winged
27. Petals unequal, or if petals equal then style absent; leaves mainly radical
Petals equal; style present; cauline and radical leaves present
28. Seeds 1-8 in each locus
Seeds solitary, pendulous from the apex of each locus
29. Fruits not triangular-obcordate
Fruits triangular-obcordate
30. Seeds up to 12 in each locus
Seeds solitary, pendulous from the apex of each locus

17. *Biscutella*
3. *Bunias*
12. *Neslia*
7. *Arnoracia*
10. *Lobularia*
11. *Erophila*
19. *Cardaria*
20. *Coronopus*
15. *Teesdalia*
16. *Thlaspi*
18. *Lepidium*
14. *Hymenolobus*
30. *Capsella*
18. *Lepidium*

1. *Sisymbrium* L.

Annual or perennial herbs; glabrous or hairs unbranched. Leaves entire to pinnatisect. Sepals not saccate at base; petals yellow, rarely white, entire. Fruit a silique; valves usually 3-veined; style distinct; stigma more or less 2-lobed. Seeds small (not more than 2.5 mm).

1. Inflorescence bracteate, later with 2-3 siliques in the axil of each leaf-like bract
Inflorescence ebracteate
2. Siliques straight, stiffly erect and appressed to the inflorescence axis
Siliques not appressed to the inflorescence axis
3. Silique 25-65 mm long, usually curved
Silique (35-) 50-100 mm long, straight
3. *polyceratum*
- 2.
4. *officinale*
- 3.
1. *irio*
2. *altissimum*

1. *S. irio* L. Plate XI London Rocket

Annual up to 60 cm high, glabrescent or with long curved hairs. Lower leaves sinuate-pinnatifid, the terminal lobe larger than the laterals; cauline leaves lobed or entire and hastate, shortly petiolate. Inflorescence condensed, the young siliques overtopping the flowers and buds; pedicels 3-6 mm long in flower, up to 20 mm long in fruit. Petals 2.5-3.5 (-6) mm long; anthers c. 0.7 mm long; Silique 25-65 x 0.7-1 mm, torulose; style rarely more than 0.5 mm; septum more or less hyaline. Seeds c. 1 mm. $2n = 42$. Fl. 2-3.

Waste and cultivated places. *Malta* and *Gozo*: frequent inland (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Probably native only in S. Europe, now widespread in Europe except the extreme north, N. Africa, the Near East and N. America.

2. *S. altissimum* L. Tall Rocket

Annual up to 100 cm high, usually hispid at base. First-formed basal leaves minute, oblong-obovate, subentire; lower cauline leaves sinuate-pinnatifid; the upper sessile, with linear lobes. Pedicels 4-10 mm long. Outer sepals with a short horn at the apex; petals 5-8 (-10) mm long; anthers 1-2 mm long. Silique (35-) 50-100 x 1-1.5 mm; style 0.5-1.5 mm, cylindrical, with shortly 2-lobed stigma. Seeds 0.8-1 mm. $2n = 14$.

Urban areas. *Malta*: infrequent (G. Lanfranco), as at Valletta and Floriana (1920), roadside near Attard (Borg).

Native of E. Europe and the Near East. Established in Europe and N. America.

3. *S. polyceratum* L. Short-fruited Rocket

Usually glabrous annual up to 75 cm high. Lower leaves sinuate-pinnatifid, the lobes triangular. Inflorescence bracteate to the apex; flowers usually fasci-

culate; pedicels 0.5-1 mm long in fruit. Petals 1.5-2 mm long, equalling or slightly exceeding sepals; anthers 0.3-0.5 mm long. Siliqua 10-25 x 0.7-1.2 mm, recurved, torulose; style thinner than siliqua. Seeds 0.6-1 mm. Fl. 3-5.

Waste places. *Malta*: frequent (Zerafa; G.D.; Gulia; Borg; G. Lanfranco).

S. Europe from Corse eastwards.

4. *S. officinale* (L.) Scop.

Hedge Mustard

Annual or biennial 5-90 cm high. Lower leaves pinnatisect, more or less ovate in outline, with a large terminal lobe. Pedicels 1-2 mm. Petals 2-4 mm long; anthers c. 0.7 mm long; ovary with 10-20 ovules. Siliqua (8-) 10-20 mm long, conical-cylindrical, straight, attenuate into style, valves hairy, or glabrous (var. *leiocarpum* DC.); style 0.5-1 mm. Seeds c. 1 mm. $2n = 14$. Fl. 2-5.

Cultivated places, along paths and edges of fields. *Malta* and *Gozo*: common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Native throughout Europe, northwards to c. 63° N., N. Africa and the Near East. Naturalised elsewhere.

2. *Descurainia* Webb & Berth.

Annual or biennial; hairs of two kinds, branched and unbranched. Leaves 2- to 3-pinnatisect. Sepals not saccate; petals pale yellow, smaller than sepals. Fruit a siliqua; valves with a distinct median vein; style very short; stigma subcapitate. Seeds small (not more than 1 mm), not mucilaginous when moistened.

1. *D. sophia* (L.) Webb ex Prantl *Sisymbrium sophia* L.

Plate XI

Flixweed

Annual or biennial up to 100 cm high. Cauline leaves with linear or oblong lobes. Pedicels 5-50 mm long in fruit. Sepals 2-2.5 mm long; stamens usually exceeding the sepals. Siliqua 8-45 x 0.5-0.75 mm, usually erecto-patent, torulose; valves reticulate-veined. Seeds 0.8-1 mm. $2n = 28$.

Malta: recorded at Santa Venera (Gulia; Borg).

Throughout Europe northwards to c. 70° N.; N. Africa; Asia; introduced in other parts of the world.

3. *Bunias* L.

Annual to perennial herbs; glabrous or with glandular, unbranched or branched hairs. Leaves entire to pinnatifid. Sepals erecto-patent, the inner not or scarcely saccate at base; petals white or yellow, not clawed. Fruit an indehiscent silicula with irregular longitudinal wings, ridges or protuberances, and with 1-4, 1-seeded loculi; style distinct; stigma capitate.

1. *B. erucago* L.

Plate XI

Southern Warty-cabbage

Hispid, glandular annual or biennial 30-60 (-100) cm high. Lower leaves sinuate-pinnatifid, rarely almost entire; upper entire or dentate. Petals (6-) 8-13 mm long, yellow, obcordate. Silicula 10-12 mm long, quadrangular, with irregularly dentate wings on the angles; loculi 4; style 3-5 mm long. Fl. 2-4.

Ruderal. *Malta*: rare, St. Clement, near Cottonera (Gulia; Borg). *Gozo*: Wied il-Lunzjata (Duthie; Borg).

S. Europe; often introduced elsewhere.

4. *Malcolmia* R. Br.

Annual to perennial herbs with branched hairs (rarely hairs of two kinds, branched and unbranched) or glabrescent. Sepals erect, the inner usually saccate at base; petals pink to violet, rarely white, long-clawed; median nectaries absent. Fruit a siliqua; valves 3-veined; style absent; stigma deeply 2-lobed, the lobes erect and connate. Seeds in 1 row in each loculus.

Sepals not saccate at base; pedicels 1-2 mm long in fruit

1. *africana*

Sepals saccate at base; pedicels 4-15 mm long in fruit

2. *maritima*

1. *M. africana* (L.) R. Br.

African *Malcolmia*

Annual up to 40 cm high with branched or stellate hairs; branches usually shorter than main stem. Leaves lanceolate, entire or sinuate-dentate. Pedicels 1-2 mm long in fruit. Sepals 3-5 mm long, not saccate; petals (5-) 8-10 (-12) mm long, violet. Siliqua 25-65 x 1-1.5 mm long, patent, rigid, more or less 4-angled, densely hispid; stigma 0.5-1.5 mm, acute.

Old walls. *Malta*: Valletta, Floriana and Blata l-Bajda (Borg).

Probably native in S. Europe and commonly occurring as a casual elsewhere.

2. *M. maritima* (L.) R. Br.

Plate XI

Gazun

Sea *Malcolmia*

Annual 10-35 cm high with medifixed or 3- to 4-fid hairs. Leaves obovate to oblong, cuneate at base, entire or dentate. Inflorescence ebracteate; pedicels 4-15 x 0.5-0.8 (-1) mm in diameter in fruit, thinner than siliqua. Sepals 6-10 mm long, with medifixed hairs; petals 12-25 mm long, pink to violet. Siliqua 35-80 x 1-2 mm, with mostly medifixed hairs; stigma 2-5 mm. Fl. 3-4.

Maritime sands and waste places. *Malta*: naturalised at Kalafrana (GD; Borg); near the tower of San Luciano (Gulia; Borg); Qajjenza (Borg; Wolseley); frequently cultivated and casual elsewhere (Borg).

S. & W. Greece, S. Albania; sometimes naturalized elsewhere.

5. *Cheiranthus* L.

Perennial herbs; hairs branched. Sepals erect, the inner saccate at base; petals yellow, long-clawed; median nectaries absent. Fruit a siliqua; valves with a distinct median vein; style short; stigma 2-lobed, the lobes patent. Seeds in 1-2 rows in each loculus; radicle accumbent.

1. *C. cheiri* L.

Plate XI

Gizi safra

Wallflower

Perennial up to 90 cm high; hairs medifixed. Lower leaves 2-10 cm long, oblong-lanceolate. Pedicels 5-15 mm long in fruit. Petals 15-25 mm long, yellow.

Siliqua 25-75 x 2-4 mm, more or less erect, compressed; style 2-3 mm. Seeds c. 3 mm. $2n = 14$. Fl. 2-4.

Cultivated and naturalised on cliffs and walls. *Malta*: Żurriq (S. & C.G.; Borg); frequent Floriana and Valletta (Borg; Sell; Wolseley).

S. Greeco islands of S. Aegean, W. Asia; Widely cultivated for ornament and naturalized on walls, cliffs and rocks in C., W. & S. Europe and N. Africa.

6. *Matthiola* R. Br.

Annual to perennial herbs; hairs branched. Sepals erect, the inner saccate at base; petals purple, white, or yellowish, long-clawed. Fruit a siliqua; valves 1-veined; style absent; stigma deeply 2-lobed, the lobes erect with a dorsal swelling or horn. Seeds in 1 row in each loculus.

1. Siliqua with 3 \pm equal triangular horns at the apex 3. *tricuspidata*

Siliqua without conspicuous horns

2. Siliqua without conspicuous glands

1. *incana*

Siliqua with large conspicuous blackish or yellowish glands even when immature

2. *sinuata*

1. *M. incana* (L.) R. Br.

Gizi

Hoary Stock

Stout perennial 10-80 cm high, woody at base. Leaves entire, rarely sinuate-pinnatifid. Lower pedicels 7-25 mm long in fruit. Sepals 9-15 mm long; petals 20-30 x 4-12 mm, purple, pink or white. Siliqua 45-160 x 3-5 mm, erecto-patent, compressed; stigma narrower than siliqua, without conspicuous horns. Fl. 2-5.

Two subspecies occur. Subsp. *incana* with lower leaves 5-22 mm wide, obtuse or subacute and sepals 9-13 mm long, and subsp. *rupestris* (Rafn.) Nyman with leaves 25-40 mm wide, acute or acuminate and sepals 11-15 mm long.

Old walls and rocks especially near the coast. *Malta*: Rare (G. Lanfranco), as at fortifications of Valletta and Floriana (S. & C.G.; Borg); St. Paul's Bay, Msida & St. Julian's (Borg); Żurriq (S. & C.G.; Gozo: Rabat (S. & C.G.; Borg); Mgarr (Gulia; Borg); San Blas (Borg); Ta' Cenè (Gulia; Wolseley); Ta' Sarraflu, Ghajj Damna, Dabiet Qorrot road (Gauci; G. Lanfranco).

Coasts of S. & W. Europe; Canary Islands; N. Africa; Asia Minor; often casual elsewhere.

2. *M. sinuata* (L.) R. Br.

Gizi

Sea Stock

Densely white-tomentose, stout biennial (rarely annual or perennial) 8-60 cm high, woody at base. Leaves sinuate-dentate to pinnatifid, the lobes oblong, obtuse; uppermost leaves entire. Lower pedicels 4-15 (-18) mm long in fruit. Sepals 8-12 mm long; petals 17-25 x 3-8 mm, all purple. Siliqua 50-150 x 3-5 mm, erecto-patent, compressed, the valves with large, conspicuous, stipitate yellow or black glands; stigma narrower than siliqua, without conspicuous horns. Fl. 4-5.

Maritime areas. *Malta*: Wied il-Hesri (Borg). *Gozo*: rare, Dwejra (Duthie); Hagrat-General (Brenner, G.D.; Borg).

Coasts of W. Europe and W. Mediterranean region.

3. *M. tricuspidata* (L.) R. Br.

Plate XI

Mediterranean Stock

Annual 7-40 cm high. Leaves sinuate-crenate to pinnatisect, the lobes ovate, rounded at apex. Lower pedicels 2-5 mm long in fruit. Sepals 7-11 mm long; petals 15-22 mm long, purple. Siliqua 25-100 x 2-3 mm, patent or deflexed, cylindrical; stigma-lobes connate to form a third horn, the 3 horns equal, 2-6 mm long, triangular, acute. Fl. 3-5.

In coastal areas. *Malta*: rare S.E. Malta (G. Lanfranco; Wolseley), as at Delimara, Kalafrana, San Luciano (S. & C.G.; Borg); Marsascirocco (Brenner; Borg); Ghajj Tuffieha, Qajjenza (Borg), Ghar Hassan area (Gauci).

Mediterranean region.

7. *Armoracia* Gilib.

Perennial herbs; glabrous. Leaves simple or pinnatifid. Sepals not saccate; petals white, shortly clawed. Fruit a subglobose to ellipsoidal silicula; valves weakly reticulate-veined; style short; stigma capitate to slightly 2-lobed. Seeds in 2 rows in each loculus.

1. *A. rusticana* P. Gaertner, B. Meyer & Scherb.

Gherk-mustarda

Nasturtium armoracia (L.) Fries

Horse Radish

Plant with stout branched stock and fleshy fusiform roots. Stems up to 1 m high or more. Basal leaves 30-50 cm long, ovate or ovate-oblong, crenato-serrate; petiole up to 30 cm long. Cauline leaves sessile or shortly petiolate, the lower often pinnatifid, the upper serrate or entire. Petals 5-7 mm long. Silicula 4-6 mm long, globose or ovoid; seeds 4-6 in each loculus. $2n = 32$. Fl. 5-8.

Malta and *Gozo*: cultivated for its root and often naturalised (Borg).

Probably native of S. Russia; cultivated in many part of the world.

8. *Nasturtium* R. Br.

Perennial herbs; glabrous or with few unbranched hairs. Leaves pinnate to pinnatisect. Inner sepals saccate; petals white, rarely pale purplish. Fruit a siliqua; valves with weak median vein; style short; stigma capitate, slightly 2-lobed. Seeds in 1-2 rows in each loculus.

1. *N. officinale* R. Br.

Plate XII

Kressxuni Sija

Water-cress

Stems 10-60 cm long, procumbent below, often rooting, then ascending or floating. Leaves pinnate, leaflets more or less entire, round or broadly elliptical; lower leaves with 1-3, upper with 5-9 or more leaflets. Petals nearly twice as long as sepals. Siliqua 13-18 mm long, ascending, straight or curved; pedicels c. 10 mm long. Seeds in 2 distinct rows in each loculus, with c. 25 polygonal depressions on each face. $2n = 32$. Fl. 1-6.

In flowing water. *Malta* and *Gozo*: common in streams along valleys (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Europe, northwards to Scotland. S. Sweden and to c. 55° N. in U.S.S.R.; N. Africa; W. Asia.

9. *Cardamine* L.

Annual to perennial herbs; glabrous or with unbranched hairs. Leaves simple to pinnate. Inner sepals slightly saccate; petals white or purple (rarely pale yellow). Fruit a strongly compressed silique; valves coiling spirally from the base at dehiscence, veinless or with indistinct median vein; style short or distinct; stigma slightly 2-lobed. Seeds in 1 row in each loculus. (Inc. *Dentaria* L.).

Petioles with small amplexicaul auricles; petals (3-) 4-6 mm long

1. *graeca*

Petioles without auricles; petals, if present, 2.5-3 mm long

2. *hirsuta*

1. *C. graeca* L.

Southern Bitter-cress

Annual or biennial 10-30 cm high; glabrous or hairy. Leaves pinnate; lower leaves with 4-5 pairs of cuneate-obovate leaflets, each with 3 or more obtuse lobes; upper cauline leaves with 2-3 pairs of 3-lobed or entire lanceolate leaflets; petioles auriculate at the base. Sepals obtuse; petals (3-) 4-6 mm long, white. Silique 3.5-5.0 x (2.5-) 3-4 mm, glabrous, papillose or setose, somewhat secund; beak 4-8 mm, winged. Seeds on a broad funicle. $2n = 16$. Fl. 2-4.

Damp places. Gozo: Rdum il-Pergla (Gulia; Borg). C.G. reports its absence in 1911.

S. Europe from Corse eastwards; W. Asia.

2. *C. hirsuta* L.

Plate XII

Hairy Bitter-cress

Annual 7-30 cm high; stems glabrous. Lowest leaves in a distinct rosette, pinnate, with 1-3 (-5) pairs of obovate to orbicular lateral leaflets and a larger reniform terminal leaflet; cauline leaves 2-4, smaller than the basal leaves, with 2-5 pairs of smaller leaflets; leaflets angular, hairy on the upper surface. Pedicels 1-2 mm at anthesis. Petals 2.5-3 mm long, white, or absent, not exceeding the sepals; stamens 4 (-6). Silique 1.8-2.5 x c. 1 mm, erect, overtopping flowers; style 0.5-1 mm, conical. Seeds 0.9-1 x 0.7-0.8 mm. $2n = 16$. Fl. 1-4.

Shaded valleys and cultivated places. *Malta*: frequent (S. & C.G.; G. Lanfranco; Wolseley). *Gozo*: Xlendi (Duthie); frequent (Borg).

Throughout Europe except the Arctic and N. Russia.

10. *Lobularia* Desv.

Annual or perennial herbs; hairs mixed. Sepals patent, not saccate at base; petals white, entire; filaments not winged and without appendages. Fruit a latiseptate silicle; valves slightly inflated, with a more or less distinct median vein; style distinct; stigma capitate. Seeds 1-5 in each loculus.

1. *L. maritima* (L.) Desv.

Plate XII

Buttunijra

Alyssum maritima (L.) Lam.

Sweet Alison

Greyish-white pubescent, or glabrescent perennial (5-) 10-40 cm high, branched at base. Leaves linear-lanceolate, acute, rarely obtuse. Petals c. 3 mm long. Silicle 2-3.5 mm long, obovate or suborbicular; valves convex, pubescent or glabrescent. Seed 1 in each loculus. $2n = 24$.

Waste places and walls. *Malta*, *Gozo* and *Comino*: very common (Borg; G. Lanfranco; Wolseley).

Mediterranean and Macaronesian regions; widely cultivated for ornament elsewhere and often naturalized or casual.

11. *Erophila* DC.

Small annual or overwintering scapigerous herbs with basal leaf-rosette. Leaves simple, entire or dentate. Sepals erecto-patent, the inner not or only slightly saccate at base; petals white or yellow, deeply bifid; filaments not or only slightly dilated at the base. Fruit a latiseptate silicle or silique; valves more or less flat, with a median vein in the lower half; style absent to long; stigma capitate. Seeds in 2 rows in each loculus, not winged.

1. *E. verna* (L.) Chevall.

Plate XII

Common Whitlow Grass

Draba verna L.

Stems solitary or several up to 20 cm high. Leaves in a basal rosette, spatulate to lanceolate, obtuse or acute, entire or distally toothed, variably clothed with branched and stellate hairs, sometimes mixed with unbranched hairs. Inflorescence racemose, initially dense, later elongating. Pedicels slender, 1.5-6 mm long in flower, elongating in fruit. Sepals 1.5-2.5 mm long; petals 1.5-6 mm long, white or reddish. Silicle 3-25 mm long, usually flat, narrowly elliptical to obovate or suborbicular, glabrous. Seeds 0.3-0.5 mm, numerous. $2n = 14-64$. Fl. 12-3.

Rocks, walls, sandy soils and disturbed ground. *Malta*: rare (G. Lanfranco), as at Il-Hawli (S. C.G.); Mgiret, Wied Babu, Hagar Qim (S. & C.G.; Borg); Wied D'alam, Wied Babu (Duthie; S. & C.G.; Borg). *Gozo*: (Gulia; Borg).

Europe except the arctic, northwards to 66°N. in Norway.

12. *Neslia* Desv.

Annuals; hairs branched. Leaves simple. Inflorescence an ebracteate raceme. Sepals erect, not saccate; petals yellow; stamens without appendages. Fruit an indehiscent, latiseptate, silicle; style distinct; stigma minute, slightly 2-lobed. Seeds 1-3.

1. *N. paniculata* (L.) Desv. subsp. *paniculata*

Plate XII

Ball Mustard

Pubescent annual 15-60 cm. Leaves oblong or lanceolate, entire or remotely dentate, the basal petiolate, the cauline sessile, amplexicaul, with acute auricles. Petals c. 2 mm long. Pedicels 5-12 mm long in fruit. Silicle 1.5-3 mm in diameter, subglobose or compressed and almost lenticular reticulate-rugose. Fl. 2-4.

Cultivated places. *Malta*: Infrequent (S. & C.G.; Borg; G. Lanfranco), Ghajn L-istas (Kramer & Westra). *Gozo*: Pergla and Mgarr (Gulia; Borg); Xewkija and Sannat (Borg).

E. & S. Europe; naturalised in the north; Near East; N. Africa.

13. *Capsella* Medicus

Annual or biennial; glabrous or with unbranched hairs. Basal leaves entire or pinnatifid; cauline sagittate-amplexicaul. Inflorescence racemose, ebracteate. Sepals erect, not saccate; petals white, pink or yellowish; stamens without appendages. Fruit an angustiseptate silicle, usually triangular-obcordate; valves keeled, reticulately veined. Style distinct; stigma minute, capitate. Seeds up to 12 in each loculus.

Petals exceeding sepals, white

Petals not or scarcely exceeding sepals, petals and sepals usually reddish-tinged

1. *bursa-pastoris*

2. *rubella*

1. *C. bursa-pastoris* (L.) Medicus Plate XII

Gargir il-gemel
Shepherd's Purse

Plant sparsely hairy, especially below, or glabrous. Flowers scentless. Sepals usually green, often pubescent. Petals 2-3 mm long, about twice as long as sepals, white (rarely absent). Silicula 6-9 x 4-9 mm, usually longer than wide, scarcely attenuate at base, usually only slightly emarginate; lateral margins usually straight or convex; apical lobes usually subacute; style c. 0.25 mm. $2n = 32$. Fl. 11-6.

Cultivated and waste places. Malta and Gozo: very common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Cosmopolitan.

2. *C. rubella* Reuter

Gargir il-gemel
Red Shepherd's Purse

Plants sparsely hairy or glabrous. Flowers scentless. Sepals usually reddish at apex, glabrous. Petals 1.5-2 mm long, scarcely exceeding sepals, usually reddish at least on margins. Silicula c. 6 x 6 mm, distinctly attenuate at base, usually fairly deeply emarginate at apex; lateral margins concave; apical lobes obtuse; style c. 0.25 mm long.

Cultivated and waste places. Malta, Gozo and Comino: frequent (Borg; G. Lanfranco).

Mediterranean region extending northwards to N. France.

14. *Hymenoclelus* Nutt. ex Torrey & A. Gray

Small annuals, hairs unbranched. Inflorescence ebracteate. Petals white, shortly clawed. Fruit an angustisepate silicula, elliptical to oblong-ovate. Seeds 3-10 in each loculus, not mucilaginous.

1. *H. procumbens* (L.) Nutt. ex Torrey & A. Gray Plate XII Creeping Hutchinsia
var. *resolieri* (Pamp.) Fiori

Hutchinsia procumbens (L.) Desv. et var. *sommieri* Pamp.

Annual or biennial with sparse unbranched hairs; stems 3-30 cm long, pro-cumbent or erect. Leaves ovate-elliptical, entire. Inflorescence many-flowered. Petals c. 1.5 mm long, spatulate, equalling or slightly exceeding the sepals. Silicula c. 3 mm long, elliptical to obovate; valves translucent, with reticulate veins. $2n = 12$, 24.

Arid places. Gozo: rare at Ta' Barrax (Gulia; Borg). Comino: (Borg).

The species occurs in C. Europe; Mediterranean region; Canary Islands; Asia, N. & S. America; Australia. The variety is known elsewhere only in Corse and Sardegna.

15. *Teesdalia* R. Br.

Annual, glabrous or with unbranched hairs. Leaves usually pinnatifid, in a basal rosette or with 1-3 cauline leaves on lateral shoots. Sepals erecto-patent; petals white. Stamens 4 or 6, the filaments with a white basal scale. Fruit an angustisepate silicula, obtuse or obcordate, with thin-walled valves, winged in the upper part; style very short or absent. Seeds 2 in each loculus.

1. *T. coronopifolia* (J.P. Bergeret) Thell. Plate XII Lesser Shepherd's-cross
(*T. nudicaulis* var. *regularis* Sm.)

Stem 8-45 cm high, often with ascending basal branches. Basal rosette leaves 25 cm long, narrowly lanceolate, usually pinnatifid with acute lobes; cauline leaves (if present) less lobed or more or less entire. Flowers c. 2 mm in diameter. Petals subequal, as long as the sepals; style absent; silicula not more than 2 mm long.

Malta: Wardija (Borg). Gozo: Ta' Ċenċ (Borg).

Mediterranean region.

16. *Thlaspi* L.

Annual or perennial herbs with sessile, \pm amplexicaul cauline leaves. Hairs unbranched or absent. Inflorescence racemose, ebracteate. Sepals erect, not saccate; petals usually white or purplish, shortly clawed; stamens without appendages. Fruit an angustisepate silicula with or without apical notch, the valves keeled and usually winged; stigma capitate, somewhat 2-lobed. Seeds 18 in each loculus.

1. *T. perforatum* L. Plate XII Perfoliate Penny-cress

Annual 5-20 (-30) cm high, glabrous, glaucous. Basal leaves rosulate, obovate, petiolate; upper cauline leaves ovate-cordate, sessile, with rounded, amplexicaul auricles; all entire or sinuate-denticulate. Sepals 1-1.5 long, with broad, white margins; petals 2-3 mm long, white; stamens shorter than the petals; anthers yellow. Silicula 5-7 mm long, broadly obcordate, convex beneath; wing broadening upwards; style c. 0.3 mm, included within the wide and fairly deep notch. Seeds 3-4 in each loculus, almost smooth. $2n = 70$. Fl. 2-5.

Waste places. Malta: rare (G. Lanfranco), as at Wied Qirra (S. & C.G.; Borg); Wied Ghomor (GD; Borg); Wied il-Baruni, Gnejna (Gulia; Borg); St. Andrews, St. Patrick's, Maghtab, Mgarr (Borg). Gozo: rare, Wied il-Lunzjata, Pergla (Gulia; Borg).

Europe northwards to c. 60°N. In Sweden; N. Africa; Near East; introduced in N. America.

(According to Borg, *Iberis umbellata* L., Garden Candytuft, was commonly cultivated for ornament and a frequent casual).

17. *Biscutella* L.

Herbs or small shrubs with entire to pinnatifid leaves. Petals usually clawed, yellow. Fruit a strongly compressed didymous silicula, indehiscent but with the 1-seeded loculi eventually breaking away from the axis; valves glabrous or with simple or clavate hairs; style long. Seeds unwinged.

Leaves lyrate; sepals c. 3 mm. long; petals c. 6 mm long; silicula 3.5-5 x 7-10 mm

Leaves dentate or denticulate, not lyrate; sepals c. 2 mm long; petals c. 4 mm; silicula 4.5-7 x 9-12.5 mm

1. *B. lyrata* L.
B. didyma var *lyrata* L.

Annual; stems up to 60 cm high, simple or branched. Basal leaves up to 18 x 5.6 cm, dense, rosulate, lyrate, attenuate into the petiole, terminal lobe broadly ovate; all lobes entire or toothed, hairy. Raceme rather dense, long in fruit. Sepals 3 mm long, petals 6 mm long; filaments filiform. $2n = 16$.

Dry places. *Malta*, *Gozo* and *Comino*: frequent (Borg).

W. Italy, Corse, Sicilia.

2. *B. didyma* L.
B. didyma var *apula* L.

Plate XII

Xeħt il-forom.
Mediterranean Biscutella

Annual; stems up to 40 cm high, simple or branched. Basal leaves up to 8 x 2.5 cm long, rosulate or not, obovate-cuneate, dentate or denticulate. Raceme dense even in fruit; pedicels erect. Sepals 2 mm long; petals 4 mm long; filaments filiform. Silicula 4.5-7 x 9-12.5 cm. $2n = 16$. Fl. 12-4.

Dry, cultivated and waste places. *Malta*, *Gozo* and *Comino*: very common (S. & C.G.; Borg; Wolseley).

C. & E. Mediterranean region.

18. *Lepidium* L.

Annual to perennial herbs, sometimes small shrubs, with usually unbranched hairs. Flowers small, in dense, terminal, ebracteate racemes. Sepals not saccate; petals white or rarely yellow (rarely absent). Stamens 2, 4 or 6. Styles short or absent. Fruit an angustiseptate silicula; valves strongly keeled winged. Seeds usually pendulous from the apex of each loculus.

1. *L. graminifolium* L.

Plate XIII

Grass-leaved Pepperwort

Perennial with erect, glabrous or sparsely hairy stems, branched above. Basal leaves up to 10 cm long, long-petiolate, oblanceolate to oblong, toothed or pinnately lobed; upper cauline leaves linear or linear-spathulate. Sepals 0.5 mm long, narrowly white-margined above the middle; petals equalling or up to 1.5 times as long as sepals, with obovate-spathulate limb. Pedicels 3-4 mm long in fruit. Silicula 2.5-4 x 1.5-3 mm, acute to acuminate, not notched, not or scarcely winged; style short, exceeding the notch. Fl. 4-9.

Urban places. *Malta*: rare (G. Lanfranco), as at Marsamxett, Marsa, Blata l-Bajda, Cortonera (Borg); Wied il-Għasel, Ta' Kandja (Gauci).

C. Europe; Mediterranean region; Asia.

[According to Borg *Lepidium sativum* L. was cultivated for salad and often naturalised in old gardens.]

19. *Cardaria* Desv.

Like *Lepidium* but the inflorescence a dense corymbose panicle and the silicula cordate, indehiscent.

1. *C. draba* (L.) Desv.
Lepidium draba L.

Plate XIII

Hoary Cress

Glabrous or sparsely pubescent perennial 15-90 cm high, producing adventitious buds on the roots. Leaves obovate to ovate-oblong, sinuate-dentate, the basal cuneate, petiolate, the cauline sessile, amplexicaul. Petals c. 4 mm long, white. Silicula 3-4.5 x 3.5-5 mm, cordate, emarginate, inflated. $2n = 64$. Fl. 4-5.

Waste places. *Malta*: rare in C. *Malta* (G. Lanfranco), as between Birkirkara and Mosta, between Qormi and Żebbuġ, Floriana (S. & C.G.; Borg); Marsa (Gulia; Borg); Lija and Balzan (Borg). *Gozo*: below Rabat along the path of Marsalforn (S. & C.G.; Borg); between Kercem and Rabat (Gauci).

Probably native of the Mediterranean region and W. Asia, but now established throughout most of Europe as a weed.

20. *Coronopus* Haller

Glabrous or with unbranched hairs. Sepals patent; petals white, small or absent. Stamens 2-6. Fruit an angustiseptate silicula, indehiscent or breaking into 2 halves; valves subglobose, verrucose, or reticulate. Seeds 2.

Silicula 2-3 x 3-4 mm, apiculate; petals 1-1.5 mm., longer than the sepals

1. *squamatus*

Silicula 1.5 x 2-3 mm, emarginate; petals, if present, 0.5 mm, shorter than sepals

2. *didymus*

1. *C. squamatus* (Forsk.) Ascherson
C. procumbens Gillib.

Swine-cress

Procumbent annual or biennial up to 30 cm high. Lower leaves pinnatifid, the segments usually pinnatifid. Racemes usually crowded in fruit; pedicels up to 2 mm long. Petals 1-1.5 mm long, longer than sepals. Fertile stamens 6. Silicula 2-3 x 3.5-4 mm, almost reniform, apiculate, strongly reticulate or ridged or verrucose; style c. 0.5 mm. Fl. 2-6.

Damp places. *Malta*: locally frequent in the valleys (G. Lanfranco), as at Wied il-Qlegha, Marsa, Salini (S. & C.G.; Borg); Wied Inċita, Wied Gerżuma, Luqa, Mosta, Wied il-Għasel, Floriana (Borg); Magħtab, Chadwick Lakes; (Gauci; G. Lanfranco). *Gozo*: more frequent (S. & C.G.; Borg).

W. C. & S. Europe, northwards to c. 66°N. in Fennoscandia; status uncertain in the northern part of its range; N. Africa; Canary Islands; introduced elsewhere.

2. *C. didymus* (L.) Sm.
Senebiera didyma (L.) Pers.

Plate XIII

Lesser Swine Cress

Procumbent or ascending biennial up to 30 cm high. Lower leaves pinnatifid, the segments usually pinnatifid. Racemes somewhat elongate in fruit; pedicels 1.5-3 mm long, longer than the silicula. Petals c. 0.5 mm long, shorter than the sepals, sometimes absent. Fertile stamens usually 2. Silicula c. 1.5 x 2-3 mm, emarginate, reticulate; style absent. $2n = 32$. Fl. 3-5.

Waste places. *Malta*: frequent (G. Lanfranco; Wolseley) as at San Anton, Valletta,

Floriana, Argotti (S. & C.G.; Borg); Marsaskala (Gulia); Għira, Blata l-Bajda Mgiret (Borg). Gozo: Rabat (Borg).

Probably native only in S. America; introduced as a weed in many other parts of the world.

21. *Conringia* Adanson

Glabrous annuals. Leaves simple, glaucous. Inflorescence a raceme. Inner sepals saccate; petals pale yellow. Fruit a silique; valves 1- or 3-veined; style short, stigma slightly 2-lobed. Seeds in 1 row in each loculus.

1. *C. orientalis* (L.) Dumort. Plate XIII Hares-ear Mustard

Plant 10-50 (-70) cm high. Basal leaves obovate, petiolate; cauline obovate to elliptical sessile, cordate-amplexicaul. Pedicels 4-9 mm long in lower, 6-20 mm long in fruit. Petals (7-) 8-13 mm long, yellowish or greenish-white. Silique (4.5-) 6-14 cm long, 4-angled; the valves 7-veined; style cylindrical. Seeds 2-2.9 mm. $2n = 14$. Fl. 6-9.

Malta: Addolorata Cemetery (Borg).

Mediterranean region and C. Europe; frequently naturalised and casual elsewhere.

22. *Moricandia* DC.

Glabrous annual or perennial herbs. Leaves simple, fleshy. Inflorescence corymbose. Inner sepals saccate at base; petals purple, rarely whitish. Fruit a silique; valves with a distinct median vein; style short, stigma 2-lobed. Seeds in 1 or 2 rows in each loculus.

1. *M. arvensis* (L.) DC. Plate XIII Purple Rocket

Short-lived perennial up to 65 cm, with branched stems. Lower leaves obovate, repand-crenate, obtuse at the apex, narrowed at the base; upper cauline leaves cordate, entire, widened and amplexicaul at the base, more or less acute. Raceme with 10-20 large, showy flowers, becoming lax. Petals c. 20 mm long, violet-purple. Silique 3-8 cm x 2-3 mm., compressed, 4-angled. Seeds c. 1 mm, biserial, brown. Fl. 3-6.

Gozo: (Gulia, without locality).

Calcicole. Mediterranean region.

23. *Diptotaxis* DC.

Annual to perennial herbs. Leaves entire to pinnatifid. Sepals erecto-patent, petals clawed, white, veined with violet, yellow or pink. Gynophore usually short. Fruit an elongate, linear silique with a short beak; valves compressed, with a prominent median vein. Seeds in 2 rows in each loculus, ovoid or rounded.

- | | |
|---|---------------------|
| 1. Flowers white or pale lilac; beak of fruit conical | 2. <i>erucoides</i> |
| Flowers yellow; beak of fruit \pm cylindrical | |
| 2. Petals 3-4 mm long; outer stamens sterile | 3. <i>viminea</i> |
| Petals at least 4.5 mm long; outer stamens fertile | |

3. Perennial; silique conspicuously stalked (1-3 mm long) above the insertion of the sepals

1. *tenuifolia*

Annual or biennial; silique not stalked above the insertion scars of the sepals

4. *muralls*

1. *D. tenuifolia* (L.) DC.

Perennial Wall-rocket

Perennial, but sometimes flowering the first year, 20-80 cm high woody at the base. Lower leaves not rosulate, petiolate, pinnatifid, with 4-8 segments, glabrous or with some hairs at the margin, foetid when crushed. Petals 7.5-14 mm long, sulphur-yellow. Silique 20-60 x 1-2 mm., borne erect on long patent pedicels; gynophore 0.5 mm, more or less conspicuous. $2n = 22$. Fl. 1-4.

On walls and waste places. Malta: frequent (G. Lanfranco), as at Marsa, near the Addolorata Cemetery (S. & C.G.; Borg); Cottonera (Gulia); Valletta, Floriana, Luqa, Qrendi, Zabbar, Siggiewi, Dwejra (Borg). Gozo: rare (S. & C.G.); Ta' Cene, Mgarr ix-Xini, Mgarr, Nadur, Qala (Borg).

W. S. & C. Europe; naturalized in Scandinavia and western margin of U.S.S.R.; casual further east and north.

2. *D. erucoides* (L.) DC.

Plate XIII

Gargir, White Rocket

Annual or overwintering, 5-50 cm high. Stems 1 or many, erect or ascending, leafy. Leaves of two types: the lower 5-15 cm long, in a lax basal rosette, oblong lyrate or pinnatisect, with 6-10 lobes, or the lowermost more or less entire or irregularly toothed; the upper sessile, more or less amplexicaul; all with sparse, slender hairs. Petals (5-) 7-13 mm long, white, violet-veined or becoming violet after anthesis. Silique (10-) 18-45 x 1.5-3 mm, ascending, with a usually 1-seeded, conical beak up to 6 mm long, and almost as wide as the valves. $2n = 14$. Fl. 10-6.

Fields and uncultivated places. Malta and Gozo: very common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

SW. Europe, extending eastwards to Italy; one station in Danube delta. Often casual in C. Europe.

3. *D. viminea* (L.) DC.

Aruka salvagħa Southern Rocket

Slender annual, 5-30 cm high, glabrous or slightly hairy. Leaves confined to a basal rosette, petiolate, lyrate-pinnatifid, the lobes entire (or spatulate and toothed, var. *integrifolia* Guss.). Petals sulphur- or lemon-yellow. Silique 10-35 (-40) x 1.25-1.75 mm, erecto-patent, borne on patent pedicels; beak short (1-2 mm long), narrow. Fl. 10-6.

Arid places along paths, on walls and in fallow fields. Malta and Gozo: common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region; often casual in E. Europe and naturalized in W. Germany, Holland and Romania

4. *D. muralls* (L.) DC.

Insalata salvagħa Annual Wall-rocket

Annual, biennial or perennial, 10-50 cm high, usually many-stemmed; stems glabrous or sparsely hispid below. Leaves usually more or less confined to a basal rosette, with petioles up to 3 cm long, lyrate-pinnatifid, pinnatifid or sinuate-dentate, sometimes spatulate entire. Cauline leaves, when present, subsessile,

coarsely toothed. Petals 4-7.5 (-8.5) mm long, bright sulphur-yellow or sometimes becoming violet. Siliqua (15-) 18-45 x 1.5-2.5 (-3) mm, erecto-patent; beak more or less conical, seedless. $2n = 44$. Fl. 1-5.
Waste places. Malta: Frequent (G. Lanfranco), as at Valletta, Floriana and Blata l-Bajda (Borg).

24. Brassica L.

Herbs or small shrubs. Leaves entire to pinnatifid. Sepals erect or patent, the inner larger than the outer. Petals yellow or white, clawed. Lateral nectaries prismatic, intense green. Ovary sometimes with a short gynophore. Fruit a siliqua with a long or short beak; valves convex, with a prominent median vein. Seeds in 1-2 rows in each loculus, globose or rarely ovoid.

Various species of *Brassica* are commonly grown as crops, and are often to be found after they have ceased to be of use for the purpose for which they were grown. Flowering and fruiting plants are thus common, and for this reason we have tried to deal with them fully in the text.

1. Upper cauline leaves amplexicaul at base
Upper cauline leaves sessile or petiolate, not amplexicaul
2. Plant glaucous, sometimes reddish; leaves usually sometimes succulent, glabrous when mature; petals 10-25 mm long, white, cream, or pale to dark yellow, long tapering into narrow bases; sepals mostly firmly erect and not spreading
Plant green or essentially so, sometimes slightly glaucous; leaves mostly thin, often sparsely setose-hairy on the veins; petals up to 12 mm long, bright yellow or sulphur-yellow, less prominently tapering; sepals often spreading
3. Petals up to 15 mm long, pale yellow; the inflorescence at anthesis short with flowers clustered at top, the blooming part usually up to 6 cm long
young radical leaves sparsely setose-hairy. 4. *napus* subsp. *napobrassica*
Petals 15-25 mm long, white or very pale coloured; the inflorescence elongated or open at anthesis, 10-25 cm long; young radical leaves glabrous
4. Leaves relatively small and thin, those on flowering stem slender petioled, stem a thickened more or less globose tuber 2. *rapistris* subsp. *gongyloides*
Leaves large, mostly thick, those on flowering stem sessile or variously clasping; stem not thickened and globose
5. Head composed of a condensed mass of short thick colourless peduncles and pedicels and thickish undeveloped flowers (cauliflower)
3. *cretica* subsp. *botrytis*
Head not so 1. *oleracea*
6. Cluster of radical leaves large and usually much developed; root a large tuber 5. *rapa* subsp. *rapa*
Cluster of radical leaves usually not much developed; root not enlarged 5. *rapa* subsp. *sylvestris*
7. Biennial or perennial; siliqua stalked above the sepal scars 6. *fruticulosa*
Annual; siliqua stalked above the sepal scars
8. Petals 5-7 mm long; siliqua 35-65 mm long 7. *tournefortii*
Petals 7-9 mm long; siliqua 10-20 mm long 8. *nigra*

1. B. oleracea L.

Kahočči
Cabbage

Glabrous biennial to perennial herb up to 300 cm high; lower part of stems becoming woody and covered with leaf-scars. Basal leaves up to 40 cm long, usually petiolate, lyrate-pinnatifid, crenate; cauline leaves ovate-lanceolate or oblong, entire, sessile (petiolate in some cultivars). Inflorescence paniculate, 20- to 50 (-300)-flowered, soon elongating. Petals 15-20 mm, yellow. Siliqua 50-70 (-100) x 2-4 (-5) mm, linear-terete, with a short conical beak 4-8 (-10) mm long, as wide as the valves at the base. $2n = 18$ (18, 36, 72 in cultivated races). Fl. 3-6.

Malta, Gozo and Comino: Subsp. *capitata* (L.) Duchesne (Cabbage) and subsp. *gemmifera* (DC.) O. Schwarz (Brussels Sprouts) are widely grown as crops and occasionally occur as escapes (Borg; Wolseley).

2. B. rupestris Rafin. subsp. gongyloides (L.) Janchen

Gidra
Kohl-rabi

Glaucous, glabrous biennial 30-60 cm high; stem short, beginning to swell at 2-4 cm above the ground and producing a solid oblong globular or depressed globular, leaf-bearing, edible tuber 5-10 cm or more in diameter. Leaves thin and relatively small, petiole about 1/3 - 1/2 as long as lamina, irregularly dentate or divided; upper cauline amplexicaul. Inflorescence elongating at anthesis. Petals 15-25 mm long, white or pale yellow. Siliqua 35-70 x 3-5 mm, with a short beak often swollen at base.

Malta, Gozo and Comino: Widely grown as a crop and sometimes occurring as an escape (Borg; Wolseley).

3. B. cretica Lam. subsp. botrytis (L.) O. Schwarz

Pastard
Cauliflower

Stout, erect plant. Leaves long oblong or elliptical, usually undivided, but sometimes obscurely lobed below, entire or minutely denticulate. Head composed of a condensed mass of short, thick colourless peduncles and pedicels and thickened undeveloped flowers; flowering panicle arising in second year, petals and fruits similar to *B. oleracea*.

Malta, Gozo and Comino: widely cultivated and sometimes occurring as an escape (Borg; Wolseley).

4. B. napus L. subsp. napobrassica (L.) O. Schwartz

Nevev
Swede

Biennial with a large tuberous, conical or globose-depressed edible root. Leaves with a large round terminal lobe and one or more pairs of small lobes on the petiole, uppermost cauline amplexicaul; young radical ones sparsely setose. Petals up to 15 mm long, pale yellow. Inflorescence at anthesis short with flowers clustered at the top, the blooming part up to 6 cm long. Siliqua with beak usually less 10 mm long.

Malta and Gozo: sometimes cultivated (Borg).

5. B. rapa L. subsp. sylvestris (L.) Janchen Plate XIV B. campestris L.

Liftija, Kawlicelli
Bargeman's Cabbage

Annual or biennial, with slender or stout tap root. Stems up to 150 cm high. Basal leaves bright green, lyrate, petiolate, with setiform hairs; upper cauline sessile, more or less entire, amplexicaul, glaucous. Open flowers overtopping buds

of inflorescence. Sepals patent. Petals 6-10 mm long, yellow. Siliqua 50-100 x 2.5-4 mm, suberect, attenuate into a long slender beak 5-15 (-30) mm long. $2n = 20$. Fl. 11-5.

Subsp. *rapa* (Turnip) is cultivated for its tuberos taproot and sometimes occurs as an escape.

Cultivated places and waste places. *Malta* and *Gozo*: very common (Borg; G. Lanfranco; Wolseley).

Weed or ruderal in much of Europe and Mediterranean region; native distribution not known with certainty.

6. *B. fruticulosa* Cyr subsp. *fruticulosa*

Mediterranean Cabbage

Annual to perennial, usually becoming woody at base; stems up to 50 cm high, erect. Lower leaves long-petiolate, lyrate-pinnatifid, with 2-3 pairs of rounded or obtuse lobes, the terminal lobe much larger than lateral, suborbicular, hispid; upper leaves smaller, pinnatifid to entire. Sepals suberect; petals 9-10 mm long, yellow. Siliqua 15-40 x 1.5-2 mm, constricted at intervals, stipitate, the stalk 1-3 mm long; beak 2-7 mm long, 3-1-seeded. Fl. 2-5.

Cultivated ground. *Malta*: Wied Ghomor, Marsa (C.D.; Borg).

Mediterranean region.

7. *B. tournefortii* Gouan

Tournefort's Cabbage

Annual, rarely perennial; stems up to 50 cm high. Lower leaves numerous, very shortly petiolate, with 7-10 pairs of obtuse lobes, hispid, especially along the thick white rhachis, and ciliate. Cauline leaves few, sessile, more or less entire, glabrous. Sepals suberect, sparsely hispid or glabrous; petals 5-7 mm long, narrowly oblong-ovate, pale yellow, usually violaceous at base, becoming whitish. Siliqua 26-65 x 2.5-3 mm; beak 10-20 mm long. $1/3 - 1/2$ as long as the valvar portion. Fl. 3-4.

Gozo: near Rabat along the path to Wied il-Lunzjata, very rare (Duthie; Borg).

Mediterranean region.

8. *B. nigra* (L.) Koch

Mustarda sewda.
Black Mustard

Annual; stems up to 100 cm high or more, branched from the middle or from near the base. Lower leaves lyrate-pinnatifid, with 1-3 pairs of lateral lobes and a much larger terminal lobe, hispid on both surfaces; upper leaves linear-oblong or sinuate, glabrous; all leaves petiolate. Petals 7-9 mm long, yellow. Siliqua 10-20 x 1.5-2 mm, attenuate into a slender, seedless beak, on short (2.5-5 mm) pedicels appressed to the stem. $2n = 16$. Fl. 3-4.

Cultivated ground. *Malta*: Infrequent (G. Lanfranco), as at Marsa (S. & C.G.; Borg), between Zabbar and Marsaskala (Gulia; Borg); Luqa (Borg). *Gozo*: rare (Duthie; Borg).

Most of Europe, but commonest in the centre and south; usually as an alien but its range as a native is uncertain.

25. *Sinapis* L.

Annual or perennial herbs. Leaves pinnatifid or pinnatisect. Sepals patent, equal or subequal; petals yellow, clawed. Lateral nectaries not prismatic. Fruit a siliqua with a long beak; valves distinctly 3- to 7-veined. Seeds in 1 row in each loculus, globose.

Siliqua with 8-17 seeds; beak cylindrical or conical, not or scarcely compressed

1. *arvensis*

Siliqua with 4-8 seeds; beak strongly compressed

2. *alba*

1. *S. arvensis* L.

Charlock

Annual; stems up to 20 cm high, usually hispid at least below, sometimes glabrous. Leaves up to 20 cm long, usually hispid; lower stalked, lyrate, with large, coarsely toothed terminal lobe, usually with several smaller lateral lobes; upper leaves sessile, usually simple, lanceolate. Siliqua 25-45 (-55) x (1.5-) 2.5-4 mm, patent; valves glabrous (or with short, stiff, deflexed hairs) var. *orientalis* (L.) Koch & Ziz; beak 10-15 mm long, straight. Seeds usually 8-13, reddish-brown or blackish. $2n = 18$. Fl. 1-5.

Cultivated and waste places. *Malta* and *Gozo*: frequent (S. & C.G.). *Comino*: (S. & C.G.). Not mentioned by Borg.

Native probably in the Mediterranean region, but introduced throughout Europe, becoming rarer in the north; Siberia; introduced in many other part of the world.

2. *S. alba* L.

Plate XIII

Mustarda
White Mustard

Annual; stems up to 80 cm high, usually with stiff, deflexed hairs, sometimes glabrous. Leaves usually hispid but not scabrid, all petiolate. Siliqua 20-40 x 3-6.5 mm, patent; beak 10-30 mm, attenuate. Seeds 4-8. Fl. 2-4.

Waste places: *Malta*: rare in E. Malta (G. Lanfranco), as at Ghajn Dwieh (S. & C.G.; Borg); along a stream on the west side of Mellieha (Duthie; Borg); Marsa, Mgret (Borg); Ta' Xbieh (Gauci). *Gozo*: Marsalforn and Ta' Cenc (Gulia; Borg).

Native in the Mediterranean region, Krym and Near East; naturalized throughout the rest of Europe but becoming rare or only casual in the north.

26. *Eruca* Miller

Like *Sinapis* but sepals erect, the inner somewhat saccate at base; valves of the siliqua 1-veined; seeds in 2 rows in each loculus.

1. *E. vesicaria* (L.) Cav. subsp. *sativa* (Miller) Thell.

Aruka
Salad Mustard

Plate XIV

Usually hispid annual 20-100 cm high. Leaves lyrate-pinnatifid (rarely pinnate), with large terminal lobe and 2-5 narrow lateral lobes on each side. Petals 15-20 mm long, whitish or yellowish with violet veins. Siliqua 12-25 x 2-6 mm, erect; beak ensiform; pedicels short. Fl. 2-5.

Frequently cultivated and often naturalized but probably native in the valleys. *Malta*: Wied Babu, Kordin, Rabat (S. & C.G.; Borg); Ghajn Tuffieha, Marsa (Borg); Naxxar, Msida (Wolseley). *Gozo*: Pergla (Borg).

Mediterranean region; cultivated as a salad plant and often naturalized, so that the native distribution is obscured.

27. *Hirschfeldia* Moench

Like *Sinapis* but sepals almost erect, the inner pair slightly saccate; siliqua with a short, swollen beak and valves 3-veined when young but obscurely veined when ripe; seeds ovoid.

1. *H. incana* (L.) Lagrèze-Fossat.
Brassica atropressa Boiss.

Plate XIV

Mustarda salvaggia
Hoary Mustard

Annual to perennial; stem up to 1 m high, usually branched, leafy, densely white-hairy below. Lower leaves runcinate-pinnatifid, with an ovate, obtuse, shallowly dentate terminal lobe; the upper simple, sessile. Flowers c. 5 mm in diameter. Petals pale yellow, often with dark veins. Siliqua 8-17 x 1-1.5 mm, erect and appressed to the stem, 2-valved; beak c. 1/2 as long as valves, swollen at base. Seeds 3-6 in each loculus. Fl. 2-5.

Fields and waste places. *Malta*, *Gozo* and *Comino*: common (Borg; G. Lanfranco; Wolseley).

Mediterranean region and Near East.

28. *Cakile* Miller

Annual, glabrous and glaucous, with succulent leaves. Petals clawed, violet, pink or white. Fruit a transversely articulate siliqua; the upper segment larger, ovoid, more or less 4-angled, not attenuate into style, with a single seed; the lower obconical, not evidently 2-valved, usually with a single seed, indehiscent.

1. *C. maritima* Scop. subsp. *aegyptiaca* (Willd.) Nyman
Plate XIV

Kromb il-bahar
Sea Rocket

Plant 15-60 cm high. Leaves entire to pinnatisect, the primary segments rarely more than 6 times as long as wide. Petals 4-14 mm long. Silicula 10-25 mm long, lower segments with 2 lateral, conspicuous, deflexed projections at the apex, upper segment expanding into a broad membranous margin at the base. Fl. 12-8.

Maritime places. *Malta* and *Gozo*: Frequent in sandy and rocky substrate (S. & C.G.; Borg; Wolseley). *Gozo*: Xlendi, Ramla, Marsalforn (S. & C.G.). *Comino*: St. Marija Bay (S. & C.G.; Borg; Wolseley).

The species occurs on coasts of Europe northwards to c. 65°N in Finland and Norway; subsp. *aegyptiaca* is confined to the Mediterranean coasts and S. Portugal.

29. *Rapistrum* Crantz

Annual to perennial herbs with unbranched hairs. Sepals erecto-patent; petals yellow, with a short claw. Fruit a transversely articulate silicula; the lower segment cylindrical, with 1-3 seeds, or seedless; the upper segment ovoid to globose, wider than the lower, indehiscent, caducous at maturity, with single erect seed; beak conical or filiform.

1. *R. rugosum* (L.) All.

Plate XIII

Bastard Cabbage

Annual 15-60 cm high, hispid below, often glabrous above. Lower leaves pinnate; upper usually dentate, petiolate. Petals 6-10 mm long, pale yellow. Silicula 3-10 mm long; upper segment 3-6 mm long (including beak), ovoid to globose, abruptly contracted into a beak 1-3 mm long; lower segment cylindrical. Fl. 2-4.

Along paths and in fields and waste places. *Malta*: frequent (S. & C.G.; Borg). *Gozo*: less frequent than in *Malta* (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region; naturalized or casual in much of C. & N. Europe and other parts of the world.

Enarthrocarpus pterocarpus (Pers.) DC. an annual with bracteate racemes, petals clawed, yellow with violet veins, and a transversely reticulate non-septate siliqua, the lower segment indehiscent the upper elongate, and constricted between the seeds, has been recorded in Valletta and Floriana (Borg) and Manoel Island (G. Lanfranco).

30. *Raphanus* L.

Annual to perennial herbs. Racemes ebracteate. Sepals erect; petals abruptly contracted into claw; filaments without appendages. Fruit a transversely articulate siliqua; the lower segment very short, slender, seedless, indehiscent; the upper circular in section, indehiscent, straight-sided or lomentaceous (at least in part), or constricted between the seeds but not breaking up into 1-seeded portions; beak narrow, seedless.

Tap-root not tuberous; siliqua not inflated, markedly constricted between the seeds

1. *raphanistrum*

Tuberous tap root; siliqua inflated, not markedly constricted between the seeds

2. *sativus*

1. *R. raphanistrum* L.

Plate XIV

Ravanell Salvagg
Wild Radish

Plant usually more or less hispid; stem 15-150 cm high, erect, branched. Basal and lower cauline leaves lyrate; upper usually entire. Sepals 5-10 mm long, elliptic-lanceolate obtuse; petals about twice as long as sepals, white, yellow, lilac or violet. Fruiting pedicels 1-5 cm long; siliqua erecto-patent, constricted between the fruits. Seeds 1.5-4 mm, ovoid to subglobose, usually reticulate. $2n = 18$. Fl. 12-5.

Three subspecies occur; subsp. *raphanistrum* has the petals 12-20 mm long and the siliqua less than 5 mm in diameter when mature; subsp. *landra* (Moretti ex DC.) Bonnier & Layens has leaves with distant lateral lobes, petals 10-15 mm long and the siliqua more than 5 mm in diameter when mature; subsp. *maritimus* (Sm.) Thell. has leaves with contiguous lobes, petals 15-25 mm long and siliqua more than 5 mm in diameter when mature.

Fields and waste places. *Malta*, *Gozo* and *Comino*: common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Throughout Europe, but only as an alien in the extreme north.

2. *R. sativus* L.

Fejgel, Ravanell
Garden Radish

Differs from *R. raphanistrum* in having a thick, napiform or cylindrical root and siliqua 20-90 x 8-15, inflated, not constricted between the (1-) 5-12 seeds.

Two subspecies occur: subsp. *sativus* has the root much thickened, fleshy and watery, red or white, round, oblong or fusiform; subsp. *niger* (Miller DC.) has the root thickened and fleshy but less watery and black or blackish externally.

Malta, Gozo and Comino: widely cultivated and a frequent escape (Borg; Wolseley).

Widely cultivated; of unknown origin.

XXXIII. RESEDACEAE

Annual to perennial herbs, rarely woody, with alternate, simple or pinnatifid leaves. Flowers in terminal, bracteate racemes or spikes. Sepals 4-8; petals 4-8, free, entire or laciniate; stamens 7-25, inserted on a hypogynous or perigynous, often excentric disc. Carpels 3-7, superior, free and unilocular ovary which is open above, with numerous ovules on parietal placentae. Fruit a capsule open at the top or consisting of 4-7, 1-seeded, radiating carpels. Seeds suborbicular or reniform, without endosperm.

1. Reseda L.

Annual to perennial. Leaves entire, toothed or pinnatifid. Sepals 4-8; petals 4-8, usually with dilated base (claw) and lobed distal portion (limb); stamens 10-25, their bases forming a disc which is often produced dorsally; carpels and stigma 3 or 4; ovary unilocular, open above; ovules numerous; capsule opening more widely at maturity.

1. Petals yellow
Petals white or cream
2. Capsule erect with 4 apical lobes
Capsule drooping with 3 apical lobes

1. *R. alba* L. Plate XV

Annual to perennial (10-) 30-80 cm high, erect, branching above. Leaf-lobes 5-15 on each side, entire. Pedicels 1-8 mm long. Sepals 5 or 6, (1.5-) 3-4 mm long; petals 5 or 6, 3.5-6 mm long; limb 3-5 times as long as claw, lobed to 1/3 - 2/3 its length; lobes 3, the lateral often again lobed. Capsule 8-15 mm long, narrowly obovate or elliptical, constricted at apex. Fl. 12-5.

On walls and in waste places and abandoned fields. Malta, Gozo and Comino: very common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Disturbed ground. S. Europe eastwards to Yugoslavia and Kriti; occasionally cultivated for ornament and naturalized in parts of C. & N.W. Europe.

2. *R. phyteuma* L.

3. Iutea

1. *alba*
2. *phyteuma*

Denb il-haruf
White Mignonette

Corn Mignonette

Annual or biennial 10-50 cm high, with ascending branches near the base. Leaves 5-100 x 5-15 mm, spatulate, long-cuneate, sometimes some with lobes on each side. Bracts 2.5-3 mm long. Sepals accrescent, 3-4.5 x c. 0.75 mm at anthesis, 5-13 x 1.25-1.5 (3.5) mm in fruit; petals 3-5 mm, white, the upper with claw below the middle stipitate, the lateral lobes pinnatifid, each with 5-9 linear-oblancoolate segments. Capsule 13-14 x 5.5-9 mm, nodding, obovoid-cylindrical.

Cultivated; often naturalised around gardens (Borg).

Mediterranean region, extending northwards to 47°N in France.

3. *R. lutea* L.

Denb il-haruf isfar
Wild Mignonette

Annual to perennial, bushy. Leaves mostly pinnatifid, with 1-2 (-4) pairs of pinnae (or leaves sometimes bi- or ternate); segments elongate. Bracts usually caducous. Petals yellow; lateral lobes of the upper falcate, subentire; mid-lobe shorter; limb of the lower entire or with 2-3 linear-spathulate lobes. Capsule 7-12 x 4.5-5.5 mm rarely nodding, oblong, oblong-obovoid or ellipsoid. Fl. 4-5.

Fields and waste places. Malta: infrequent (S. & C.G.; Borg; G. Lanfranco). Gozo: Mgarr ix-Xini; Nadur; Xaghra (Borg).

C. & W. Europe and Mediterranean region; probably a naturalized alien further north and east.

ROSALES

XXXIV. CRASSULACEAE

Annual biennial or perennial herbs, rarely small shrubs. Leaves undivided, sessile, more or less succulent. Flowers regular, usually in cymes, less often in spikes or racemes or solitary in the leaf-axils. Sepals 3 to c. 20, united or free; petals as many, united or free; stamens hypogynous or epipetalous, equal in number to the petals or more frequently, twice as many. Carpels superior, equal in number to the petals, free or slightly connate at the base, developing into follicles. Scale-like nectaries usually present between the stamens and carpels.

1. Stamens equal in number to the petals
Stamens twice as many as the petals

2. Leaves opposite, connate; petals 3-4
Leaves not connate; petals 5

3. Basal leaves more or less orbicular
Basal leaves not orbicular

4. Flowers 9-11-merous
Flowers 5-8-merous

1. *Crassula*
4. *Sedum*

2. *Umbilicus*

3. *Aconium*
4. *Sedum*

1. *Crassula* L.

Small, glabrous annuals, with opposite, connate, often reddish leaves. Flowers 4- or 5-merous. Petals free. Stamens equal in number to the petals.

The characteristic habitat of these species is ground flooded in winter and dry in summer.

Leaves ovate, concave, crowded; flowers usually 3-merous

1. *Tillaea*

Leaves broadly linear, flat, patent; flowers usually 4-merous

2. *vaillantii*

1. *Crassula* Lester-Garland
Tillaea muscosa L.

Mossy Stonecrop

A minute, moss-like plant with prostrate or ascending stems. Leaves 2 mm long, ovate, concave, crowded, almost imbricate. Flowers 3- (rarely 4-) merous, sessile in small groups in the leaf-axils. Petals 1 mm long, shorter than the sepals, narrowly lanceolate, white or pale pink. Follicles usually 2-seeded. Fl. 1-2.

Rocky places. *Malta*: infrequent; as at Mgiret, Wied Inčita, Bingemma (S. & C.G.; Borg); Wied Ballut (C.G.; Borg); Wied Xkora (Gulia; Borg); Wied Qirda, Buskett (Borg); San Pawl tat-Targa (Gauci; Lanfranco).

Mediterranean region and W. Europe, extending locally to N.E. Germany.

2. *C. vaillantii* (Willd.) Roth Plate XV Narrow-leaved Mossy Stonecrop
Bulhardia vaillantii (Willd.) DC.

Stems 2-6 cm high, erect or ascending. Leaves 3-5 mm long, linear-oblong, obtuse patent, not crowded. Flowers 4-merous, on slender pedicels longer than the leaves, forming small irregular cymes. Petals longer than the sepals, ovate-lanceolate, acute, pink. Follicles with numerous seeds. Fl. 2-4.

Shallow pools on rocky ground. *Malta*: locally frequent (G. Lanfranco), as at Bahrija, Wied Ballut, Wied Ghomor, Wied Inčita, Buskett, Faqqarija, Wied Qirda, Wied il-Ghasel, Gharghur, St. Julians Mgarr, Fomm ir-rieh (Borg); San Pawl tat-Targa (Borg; Wolseley); Nigret (Wolseley). *Gozo*: Xlendi, Ta' Cené, Nadur, Xagħra (Borg); Munxar (Wolseley; Kramer & Westra).

S. Europe extending northwards to N. France, S. Ukraine and the lower Volga, rare and local over most of its range; Africa.

2. *Umbilicus* DC.

Perennials, with tuberous or rhizomatous rootstock. Basal leaves petiolate, usually suborbicular, at least 2 cm in diameter, glabrous. Cauline leaves much smaller. Flowers 5-merous, numerous, in a terminal, bracteate raceme or panicle. Calyx small. Corolla tubular or campanulate, distinctly sympetalous; lobes more or less erect. Stamens 10 (rarely 5), epipetalous; filaments short. Follicles slender, styles rather short or absent.

Flowers usually pendent; raceme occupying more than half the stem; corolla lobes ovate, mucronate

Flowers horizontal; raceme occupying not more than half the stem; corolla lobes lanceolate, acute

1. *U. rupestris* (Salisb.) Dandy Zoqret l-ghagħusa
Cotyledon umbilicus-veneris var. *tuberosa* L. Wall Navelwort

Stem 20-50 cm high erect. Basal leaves orbicular, peltate, concave above sinuate-crenate; cauline leaves progressively smaller, mostly reniform, dentate, the uppermost sometimes linear. Bracts usually linear, about equalling the pedicels, but occasionally large and leaf-like. Pedicels 3-9 mm long. Flowers 7-10 mm long, tubular, usually pendulous; raceme fairly dense, sometimes branched at the base, occupying more than half the stem. Sepals ovate, acuminate. Corolla whitish-green or straw-coloured, sometimes tinged with pink; tube about 4 times as long as the ovate, mucronate lobes. Carpels tapered to fairly long style. Fl. 4-5.

Rocks and old walls. *Malta*: Infrequent (G. Lanfranco); as at Wied Ballut (S. & C.G.); Pietà, Sħema (G.D.; Borg); Rabat, Wardija, Wied Inčita, Hemsija (Borg); Wied Żunber (Gulia; Borg).

S. & W. Europe northwards to Scotland.

2. *U. horizontalis* (Guss.) DC. Plate XV Zoqret l-ghagħusa
Cotyledon umbilicus-rupestris var. *horizontalis* Guss. Narrow Navelwort

Like *U. rupestris* but with the raceme occupying not more than half the stem; cauline leaves more numerous and crowded, many of them linear; flowers narrower and somewhat shorter (c. 7 x 3 mm), subsessile, horizontal; and corolla lobes triangular, lanceolate, acuminate. $2n = 24$. Fl. 4-5.

Rocks and old walls. *Malta* and *Gozo*: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region, Bulgaria; Azores.

3. *Aeonium* Webb & Berth.

Perennial, with erect, subliguous stems and alternate leaves crowded into terminal rosettes. Flowers 9- to 11-merous, in a panicle. Petals free, yellow. Stamens twice as many as the sepals.

1. *A. arboreum* (L.) Webb & Berth. Plate XV Tree House-leek
Sempervivum arboreum L.

Stem 50-80 cm high, stout, with suberect branches, marked by conspicuous leaf-scars. Leaves c. 6 x 2 cm, oblanceolate-cuneate, ciliate-denticulate but otherwise glabrous, bright shining green. Flowers numerous, in a compact, ovoid panicle. Petals 6-7 mm long, bright yellow. Fl. 12-2.

Malta: cultivated since 1830, often naturalized on walls and in rocky or arid places as at Wied is-Sewda, Gudja, Rabat (Borg); San Gwann (Msierah) (Wolseley); Mellieħa (Kramer & Westra).

Rather widely naturalized on the coasts of the Mediterranean and of Portugal; native of Morocco.

4. *Sedum* L.

Leaves usually alternate, seldom crowded into rosettes. Inflorescence usually cymose. Flowers hermaphrodite, usually 5-merous but sometimes 4 or 6- to 9-merous. Petals free or slightly connate at the base, usually patent. Stamens usually twice as many as the petals, sometimes equal in number. Carpels equal in number to the petals.

- | | |
|--|-----------------------|
| 1. Petals greenish-white or yellow | 2. |
| Petals blue, pink or pure white | 3. |
| 2. Petals greenish-white, equalling or slightly exceeding sepals; stems 4-15 cm high | |
| Petals yellow, twice as long as sepals; stems 25-60 cm high | 4. <i>litoreum</i> |
| 3. Perennial with leafy non-flowering shoots | 1. <i>sediforme</i> |
| Annual; no non-flowering shoots present at flowering season | 2. <i>dasyphyllum</i> |
| 4. Petals blue | 4. |
| Petals white or pink | 7. <i>caeruleum</i> |
| 5. Leaves 3-6 mm long; stems 2-5 cm high | 5. |
| Leaves 10-20 mm long; stems 3-15 cm high | 6. <i>caespitosum</i> |
| | 6. |

6. Leaves suborbicular, flat, crenate or dentate with short, broad petiole
Leaves linear, entire, subcylindrical

3. stellatum
5. rubens

1. *S. sediforme* (Jacq.) Pau
S. rupestre var. *nicaense* (All.) Fiori

Mediterranean Stonecrop

Robust, somewhat glaucous perennial with ascending flowering stems 25-60 cm high and shorter non-flowering shoots, both woody at the base. Leaves oblong or narrowly ellipsoidal, thick but somewhat flattened on upper surface, usually apiculate or mucronate, shortly spurred, suberect, closely imbricate in spiral rows on the non-flowering shoots. Inflorescence erect and subglobose in bud, with strongly recurved branches, concave in fruit. Flowers 5- to 8-merous, on very short pedicels. Sepals c. 2.5 mm long, ovate, obtuse or mucronate, glabrous. Petals 4-7 mm long, patent, greenish-white or straw-coloured. Stamens 10-16. Follicles erect, pale yellow or greenish-white. $2n = 32$. Fl. 6-7.

Arid rocky places *Malta*: locally common (G. Lanfranco), as at Wied Żnuber, Wied-Moqbel (S. & C.G.); Ta' Lawrenti (Borg); Wieh Babu (S. & C.G.; Borg; Wolseley); Wied Inċita, Buskett, Dingli (Borg; Wolseley); Misraħ Ghonoq, San Pawl tat-Tarġa, Nigret (Wolseley). *Gozo*: Xlendi, Wied Bingemma, Mgarr ix-Xini (S. & C.G.; Wolseley); Munxar (Wolseley).

Mediterranean region, extending to Portugal, N. Spain and C. France.

2. *S. dasyphyllum* L.

Thick-leaved Stonecrop

Perennial 3-8 cm high, glandular-pubescent at least on the inflorescence and sometimes all over, usually pruinose and tinged with greyish-pink. Leaves 3-5 mm long, ovoid or suborbicular, flattened on upper surface, mostly opposite, loosely imbricate on the non-flowering shoots. Flowers 5- or 6-merous, stalked, in small cymes. Petals 3 mm long, white streaked with pink. Stamens 10 or 12. Follicles nearly erect; style short, turned sharply outwards. $2n = 28, 42, 56$. Fl. 4-7.

Arid rocky places particularly the Rdum areas along the N.W. cliffs. *Malta*: rare. Wied Babu, Rdum il-Madliena (S. & C.G.; Borg); Il-Fawwara (Gulia; Borg); Rdum Dikkiena, il-Kaws (Borg).

Mediterranean region and parts of C. Europe; naturalized in the north-west.

3. *S. stellatum* L.

Starry Stonecrop

Glabrous annual; stem 3-15 cm high, stout, erect or ascending. Leaves 10-15 mm long, flat, with a short, broad petiole and suborbicular lamina, crenate or bluntly dentate, the upper alternate, the lower often opposite. Flowers 5- (rarely 4-) merous, sessile. Sepals broadly linear, accrescent, papillose at the apex. Petals 4-5 mm long, acute, pink. Stamens 8 or 10. Follicles stellate-patent; styles very short. Fl. 3-6.

Malta: rare, Wied Zenka a branch of Wied il-Ghasel (S. & C.G.; Borg); Wied Has Saptan (Gulia; Borg).

Mediterranean region.

4. *S. litoreum* Guss.

Coastal Stonecrop

A glabrous annual; stem 4-15 cm high, branches erect. Leaves 10-20 mm long, alternate, obovate-spathulate, flattish, shortly spurred. Flowers 5-merous, subsessile, in long, lax cymes. Petals 2.5-4 mm long, equalling or slightly exceeding the sepals, lanceolate, acute, pale yellow. Stamens 5, rarely 10. Follicles erecto-patent; styles short. Fl. 3-5.

Rocky places near the sea. *Malta*: Marfa, Cirkewwa (Borg); Salini (Kramer & Westra); Madliena (Gauci). *Gozo*: Ras il-Qala (Duthie; S. & C.G.; Borg); Mgarr (Kramer & Westra). *Comino*: frequent (S. & C.G.; Borg; Wolseley). *Cominotto*: Duthie; Borg).

E. & C. Mediterranean region; W. Asia.

5. *S. rubens* L.

Red Stonecrop

Erect annual 5-12 cm high, glandular-pubescent above, somewhat glaucous and usually reddish. Leaves 10-20 mm long, alternate, patent, linear, semiterete. Flowers 5-merous, sessile, in a leafy, corymbose cyme. Petals 5 mm long, sharply acuminate, white or pink. Stamens 5, rarely 10. Follicles divergent at the base but suberect in upper part, glandular-tuberculate. Styles long, straight. Fl. 3-6.

Arid and rocky places, *Malta*, *Gozo* and *Comino*: frequent (S. & C.G.; Borg; Kramer & Westra). *Cominotto*: (Duthie; S. & C.G.; Borg).

Mediterranean region and W. Europe, extending to Switzerland and S.W. Germany.

6. *S. caespitosum* (Cav.) DC.

Broad-leaved Stonecrop

Glabrous, usually reddish annual; stem 2-5 cm high, erect. Leaves 3-6 mm long, alternate, imbricate, subterete, broadly ovoid. Flowers 4- or 5-merous, sessile, in short cymes. Petals 3 mm long, mucronate, white tinged with pink. Stamens 4 or 5. Follicles patent, glabrous. Fl. 3-4.

Rocky arid places that collect rain water in winter. *Malta*: Wied Ghomer, Buskett, Wied Babu, Wied Inċita (S. & C.G.; Borg); Wied il-Ghasel (Borg; Wolseley). *Gozo*: Ta' Cenċ, Xlendi (S. & C.G.; Borg); Mgarr ix-Xini (Borg).

Mediterranean region and S.C. Europe.

7. *S. caeruleum* L.

Plate XV

Bezzulet il-bagħra
Azure Stonecrop

A bushy, erect, annual 5-20 cm high, often pubescent above, usually strongly tinged with red. Leaves c. 10 mm long, alternate, terete, linear-oblong. Flowers numerous, usually 7-merous, on slender pedicels in a broad, lax panicle. Petals lanceolate, sky-blue, white at base. Stamens twice as many as the petals. Follicles erecto-patent; style long, straight. Fl. 3-5.

Rocky places flooded in winter, arid in summer. *Malta*, *Gozo* and *Comino*: abundant (S. & C.G.; Borg; G. Lanfranco; Wolseley; Kramer & Westra).

Islands of W. Mediterranean.

XXXV. SAXIFRAGACEAE

Herbs, mostly perennial. Flowers 4- or 5-merous, usually in cymes (rarely solitary or in racemes). Petals usually 4-5, sometimes 0. Stamens twice as many as the sepals, or rarely equal in number or fewer. Carpels 2; united below but usually divergent above; styles free. Ovary superior, semi-inferior or almost inferior. Fruit a capsule; seeds numerous.

1. Saxifraga L.

Herbs, sometimes rather woody at the base; usually perennial, rarely annual or biennial. Leaves simple, but often deeply dissected and sometimes apparently ternate; usually alternate or basal, rarely opposite; foliar glands, if present, superficial or on hairs. Flowers 5-merous, usually in cymes or panicles, rarely solitary in leaf-axils. Petals present; stamens 10; ovary superior or, more often, semi-inferior.

Plate XV

Rue-leaved Saxifrage

1. S. tridactylites L.

A slender annual, usually somewhat glandular-hairy; stem up to 20 cm high but often only 3-8 cm high, branched except in depauperate plants. Basal leaves spatulate, entire, very small, not forming a rosette and withered at flowering time; cauline leaves cuneate, usually divided distally into 3, triangular-oblong lobes. Flowers in a lax, somewhat leafy cyme or panicle; pedicels much longer than flowers or fruits. Petals 2-3 mm long, emarginate, white, about twice as long as the sepals. Capsule subglobose, with a rounded or truncate base. Seeds coarsely papillose. 2n = 22. Fl. 2-4.

Malta: very rare: on a stretch of rock on the Zebbug side of the valley Wied Incita (Borg).

Europe except the extreme north and C. & E. Russia; N. Africa; W. Asia.

XXXVI. ROSACEAE

Trees, shrubs or herbs. Leaves usually alternate and stipulate. Flowers regular, usually hermaphrodite, perigynous or epigynous. Hypanthium flat, concave or tubular. Sepals usually 5, sometimes with epicalyx, petals usually 5, free, sometimes absent. Stamens usually 2, 3 or 4 times as many as sepals, rarely indefinite. Usually 2 anisotropous ovules per carpel, sometimes 1 or more. Styles free or 1-5. Usually 2 anatropous ovules per carpel, sometimes 1 or more. Styles free or rarely united. Fruit of one or more achenes, drupes or follicles, or a pome; the hypanthium sometimes becoming coloured and fleshy. Endosperm usually absent. 'Hypanthium' is used in this family to denote that part of the flower which bears the sepals, petals and stamens on its outer or upper margins and on which the carpels are borne. The hypanthium is often, at least in part, receptacular in nature, but it is sometimes fused, to a variable extent, with the walls of the carpels, the exact line of demarcation being difficult to determine.

1. Trees or shrubs (sometimes dwarf) Herbs

2. Leaves pinnate or digitate Leaves simple

3. Unarmed trees Usually spiny shrub

9. Sorbus

4. Carpel exposed on the hypanthium; fruit a head of drupelets, blackish when ripe
Carpels enclosed in the hypanthium; ripe fruit red

1. Rubus
2. Rosa

5. Carpels not adnate to the hypanthium; fruit not a pome
Carpels enclosed in, and adnate to the hypanthium; fruit a pome

13. Prunus

6. Flowers solitary
Flowers in 2 to many-flowered inflorescences

6.

7. Sepals shorter than petals, dentate
Sepals larger than petals, entire

6. Cydonia
11. Mespilus

8. Walls of carpels becoming stony in fruit
Walls of carpels becoming cartilagenous in fruit

12. Crataegus

9. Flowers in panicles; evergreen
Flowers in umbels, racemes or few-flowered clusters; deciduous

10. Eriobotrya

10. Styles free; flesh of fruit with stone cells
Styles connate at base; flesh of fruit without stone cells

11.

11. Petals 0
Petals 4 or more

7. Pyrus
8. Malus

12. Sepals 4-6; epicalyx absent
Sepals 4-5; epicalyx segments 4-5

2. Sanguisorba

13. Flowers yellow
Flowers white

1. Rubus

4. Potentilla
5. Fragaria

Subfam. ROSEOIDEAE

Stipules present, usually persistent. Flowers usually 4, 5- or 6-merous. Hypanthium flat or concave, often with a central carpophore, sometimes campanulate or tubular; epicalyx sometimes present; stamens usually numerous, sometimes enclosed in or adnate to the hypanthium.

1. Rubus L.

Perennial herbs or shrubs. Stems usually with prickles. Leaves usually pinnate, digitate or pedate, with 3-7 dentate leaflets. Flowers solitary or in racemose or paniculate inflorescences. Flowers usually 5-merous; hypanthium flat, with a large, usually convex receptacle; epicalyx absent; petals red, purple, pink or white; stamens numerous; carpels numerous; styles subterminal, usually deciduous; ovules 2. Fruit usually a coherent head of 1-seeded drupelets.

Leaflets 3-7, pedate; drupelets usually more than 20

1. ulmifolius

Leaflets 3, ternate; drupelets 2-20

2. caesius

1. R. ulmifolius Schott

Plate XV

Chollieq
Bramble

Stems robust, arching or procumbent, angled, often sulcate, pruinose, glabrous to tomentose with semi-appressed hairs; prickles robust, broad-based, patent to imbricate, hairy. Leaves pedate, often very small; leaflets 3-5, dark green and glabrous above, white-tomentose beneath, convex, variously toothed, coriaceous; terminal

leaflet ovate or suborbicular to obovate. Inflorescence often long and narrow, sometimes pyramidal, leafy at the base, with patent branches and long pedicels all axes with robust, broad-based, patent to falcate hairy prickles. Sepals deflexed after flowering, sometimes slightly aciculate, white-tomentose; petals crumpled orbicular or ovate, sometimes jagged at the apex, pink or occasionally white; stamens white or pink equalling or just exceeding the green, pink or white styles; anthers glabrous; pollen completely fertile; drupelets usually more than 20 hairy, often tomentose. Fl. 4-10.

In valleys and sheltered places. *Malta*: locally frequent (G. Lanfranco; Wolseley); as at San Martin, Mtaħleb, Ġirgenti, etc. (S. & C.G.; Borg). *Gozo*: Xlendi (S. & C.G.; Borg; Wolseley), Mgarr ix-Xini, Mgarr, Nadur (Borg; Wolseley); Perġa (Wolseley).

Mediterranean region. W. & C. Europe; W. Asia; naturalized in many other parts of the world.

2. *R. caesius* L.

Dewberry

Stem flagelliform, branched, terete, glabrous, pruinose, rarely with a few short glands; prickles few or many, weak, short, straight or falcate. Leaves ternate, slightly hairy above, more or less pubescent, terminal leaflet ovate, sometimes more or less 3-lobed, shortly acuminate, subcordate, rather coarsely biserrate; lateral leaflets often bilobed; petiole sulcate; stipules ovate-lanceolate. Inflorescence short, consisting of a terminal and a few axillary 2-5 flowered corymbs; pedicels long with short hairs, fine glands and sparse prickles; flowers 2-2.5 cm in diameter. Sepals appressed to the developing fruit, ovate-lanceolate, shortly acuminate, grey-green tomentose with white margin and short glands; petals large, ovate, elliptical or suborbicular, white; stamens green, equalling the greenish styles. Drupelets 2-20, large, black, pruinose, loosely coherent. Somewhat calcicole. $2n = 28$. Fl. 4-6.

Rocky places. *Malta*: Wardija (Gulia; Borg). *Gozo*: Xlendi, Wied ir-Rihan (S. & C.G.; Borg); Wied il-Lunzjata (Gulia; Borg; Borg); San Blas (Borg).

Europe from Scandinavia (62°N) and N. Russia to Spain and Portugal, Sicily and Greece; W. Siberia and Russian C. Asia to Asia Minor.

2. *Rosa* L.

Shrubs, usually deciduous. Stems usually with prickles. Leaves pinnate, stipules usually adnate to petiole. Flowers terminal, solitary or in corymbs, (4-) 5-merous. Hypanthium urceolate becoming coloured and fleshy in fruit; epicalyx absent; stamens and carpels numerous; styles protruding through the orifice of a disc sometimes forming a short column; ovules 1. Fruit a pseudocarp of numerous achenes enclosed in the hypanthium.

1. Styles connate in a column
Styles free
2. Leaflets coriaceous; petals (25-) 30-45 mm long
Leaflets not coriaceous; petals 12-18 (-24) mm long

1. *sempervirens*

2. *gallica*
3. *corymbifera*

1. *R. sempervirens* L.

Ghirlanda tal-wied
Evergreen Rose

Evergreen with long creeping stems. Prickles sparse, curved, markedly decurrent at the base. Leaflets (3-) 5-7, 30-60 x 10-20 mm, coriaceous, ovate-lanceolate, acuminate, serrate, glabrous, shining; stipules narrow. Inflorescence (1-) 3-7-flowered.

erect, corymbose. Pedicels glandular-hispid, 2-4 times as long as the fruit. Sepals ovate, long-acuminate, usually entire, glandular with stalked glands on the margins and back, deflexed and deciduous after anthesis. Petals 10-20 (-30) mm long, white. Styles connate in a column, hairy or glabrous. Fruit around 10 mm, globose or broadly ovoid, red. Fl. 3-6.

In moist valleys. *Malta*: rare, Buskett, Wied Inċita (S. & C.G.; Borg); Wied Dalam near the village of Ghaxaq (Duthie); Wied il-Għasel (Borg). *Gozo*: Mgarr (Gulia; Borg).

Mediterranean region and S.W. Europe northwards to 47° 30' in W. France.

2. *R. gallica* L.

Plate XV

Warda taż-zejt
Provence Rose

Deciduous shrub 0.4-0.8 m, forming large patches. Stem with prickles and glandular setae. Leaflets 3-7, 20-60 x 18-30 mm, coriaceous, suborbicular or ovate to narrowly elliptical, rounded at the apex, usually compound-serrate, dull bluish-green and glabrous above, paler, pubescent and glandular beneath. Flowers solitary, rarely 2-4, 6-9 cm in diameter, strongly scented. Pedicels glandular-setose. Sepals glandular on the back. Petals (2-5) 30-45 mm long, deep pink; styles free, densely hairy, rarely glabrous. Fruit globose to fusiform, densely glandular-setose, bright red. Fl. 4-6.

Moist valleys. *Malta*: rare, at Wied il-Għasel, Ghemieri, Wardija (Borg); Ta' Baldu (S. & C.G.; Borg); Kordin (S. & C.G.). *Gozo*: Wied il-Lunzjata (Gulia; Borg).

C. and S. Europe; Asia Minor to Caucasus.

3. *R. corymbifera* Borkh.
- R. dumetorum* Thuill.

Pale Rose

Stems up to 2 m high, green; prickles scattered, short, stout, compressed, strongly hooked. Leaflets 5-7, 15-35 x 14-25 mm, broadly elliptical to suborbicular, rarely narrower, simply serrate, sometimes glabrous above, usually eglandular; petiole and rachis densely pubescent, more or less glandular, covered with minute adicles. Pedicels 5-13 mm, glabrous. Sepals eglandular, deflexed and caducous after anthesis. Petals 12-18 (-24) mm long, white or pale pink. Disc wide, with the orifice less than 1 mm wide. Styles free, long exserted, villous or rarely glabrous. Fruit 10-20 mm, ovoid or globose, glabrous, red. Fl. 4-6.

Gozo: Ta' Ċenē (Gulia; Borg). Listed by C.G. as disappeared by 1911.

Europe; W. Asia.

3. *Sanguisorba* L.

Perennial herbs. Leaves pinnate. Flowers hermaphrodite or polygamous in dense terminal spikes or heads, with 2 (-3) bracteoles below each flower. Hypanthium deeply concave; sepals 4; epicalyx and petals absent; stamens 4 or numerous, rarely 2; carpels 1-2 (-3), terminal. Fruit of 1 (-2) achenes enclosed in the 4 angled hypanthium which becomes dry and hard.

4. *S. minor* Scop.
- Poterium sanguisorba* L.

Plate XVI

Tursin il-Għawli
Salad Burnet

Plant 10-90 cm high, glabrous or hairy, with well developed basal leaf-rosette. Flowering stems erect, leafy, rarely leafless. Leaves with 3-12 pairs of orbicular

to elliptical leaflets; leaflets 0.5-2 cm, more or less stalked, crenate to incise serrate, mostly of equal size. Capitula 1-3 cm long, globose to ovoid. Hypanthium 3-8 mm wide, usually angled, ridged or winged and with faces reticulate or sculptured in various ways. $2n = 28$. Fl. 3-5.

The plants in Malta are probably all subsp. *maricata* Briq.

Dry open places and valleys. *Malta*, *Gozo* and *Comino*: frequent (S. & C.G.; Borg; Haslam; G. Lanfranco; Wolseley).

Britain, C. and S. Europe, north to S. Sweden and Volga-Don region; Armenia, N. Persia; Morocco; naturalised in N. America.

4. *Potentilla* L.

Usually perennial herbs. Leaves digitate, pinnate or ternate. Flowers solitary or in cymes, (4-) 5 (-6)-merous. Hypanthium more or less flat with a central, hemispherical, dry or spongy receptacle; epicalyx present; stamens 10-30; carpels (4-) 10-80; style nearly basal, lateral or terminal. Fruit a head of achenes; styles usually not persistent.

Flowers in cymes
Flowers solitary

1. *hirta*
2. *reptans*

1. *P. hirta* L.

Hairy Cinquefoil

Flowering stems 10-70 cm high, terminal, pubescent with long patent eglandular hairs. Leaves digitate; leaflets 5-7, 15-100 x 5-35 mm, linear to oblong-ob lanceolate, rarely obovate, with 3-7 obtuse teeth or lobes at the apex. Flowers numerous. Cymes lax. Sepals triangular-ovate; epicalyx-segments linear to linear-lanceolate, as long as or slightly longer than sepals. Petals 6-12 mm long, yellow, longer than sepals. Style conical-cylindrical. Fl. 4-5.

Arid places. *Malta*: Wied Inčita (G.D.; Borg); Is-Sisjen (Gulia; Borg). Included by C.G. in plenty, disappeared by 1911.

S. & C. Europe; W. Asia; Siberia; N. Africa; naturalised in N. America.

2. *P. reptans* L.

Plate XVI

Frawli salvaggi
Creeping Cinquefoil

Perennial herb; stock relatively slender with a persistent rosette of leaves; flowering stems 30-100 cm high, procumbent, rooting at the nodes, glabrous or pubescent. Leaves digitate; leaflets 5 (-7), 5-70 x 3-25 mm, obovate or oblong-obovate, dentate or serrate-dentate. Flowers 5-merous, all solitary, axillary. Sepals and epicalyx segments variable. Petals (7-) 8-12 mm long, yellow, up to twice as long as sepals. Stamens c. 20. Carpels 60-120. Style conical at base, enlarged at apex. $2n = 28$. Fl. 3-6.

Valley bottoms along stream beds. *Malta* and *Gozo*: locally frequent (S. & C.G.; Borg; G. Lanfranco); Wied Inčita (Borg; Haslam; Wolseley); Buskett (Haslam); Wied il-Ghasel, Wied Ghomor and Fiddien valley (Wolseley); Mgarr ix-Xini (Kramer & Westra).

Europe (except Island); Mediterranean region; W. Siberia, Turkistan, Persia, Himalaya; introduced in America.

5. *Fragaria* L.

Like *Potentilla* but receptacle becoming fleshy and brightly coloured in fruit; achenes on the surface or sunk in pits.

1. *F. moschata* Duchesne

Frawli Maltija
Wood Strawberry

Perennial herb, sometimes with few rooting stolons. Leaves 3-foliate in a basal rosette; leaflets 1-6 cm long, ovate or obovate to rhombic, coarsely serrate, bright green and sparsely hairy on upper surface. Scape 5-40 cm high, longer than the leaves, erect in fruit. Pedicels patent-pubescent. Flowers c. 20 mm in diameter, usually unisexual, white. Achenes uniformly scattered over and projecting from the usually red glabrous receptacle. Fl. 3-8.

Malta and *Gozo*: cultivated and sometimes naturalized on irrigated lands (Borg).

C. Europe extending to N.W. France, C. Italy, Turkey and C. Russia; widely naturalized from gardens elsewhere.

(The Garden Strawberry, *Fragaria x ananassa* Duchesne is grown in gardens.)

Subfam. MALOIDEAE

Stipules present, usually caducous. Flowers 5-merous. Hypanthium tubular, not open at the apex and completely enclosing the 2-5 more or less connate carpels which are more or less adnate to the hypanthium; epicalyx absent; stamens numerous; styles 5, free. Fruit many-seeded.

6. *Cydonia* Miller

Deciduous shrubs or trees. Leaves entire. Stipules caducous. Flowers solitary. Sepals shorter than petals, dentate, persistent; stamens 15-25; carpels 5, walls cartilaginous in fruit; ovules numerous; styles 5, free. Fruit many-seeded.

1. *C. oblonga* Miller *Pyrus cydonia* L.

Plate XVI

Sfargel
Quince

Shrub or tree 1.5-6 m high. Shoots at first villous later glabrous. Leaves 5-10 x 3.5-7.5 cm, ovate, entire. Flowers 4-4.5 cm in diameter; pedicels short, tomentose. Petals pink. Fruit 2.5-3.5 cm (5-12 cm in cultivation) long, globose or pyriform, fragrant, yellow, tomentose. $2n = 34$. Fl. 3-5.

Malta and *Gozo*: Cultivated and occasionally found in old gardens and valleys (Borg).

Native of C. Asia; cultivated and naturalised in Europe, N. Africa and temperate America.

7. *Pyrus* L.

Deciduous trees or shrubs, often spiny on lower branches or when young. Leaves simple, rarely lobed; stipules caducous. Flowers in corymbs; stamens 15-30; anthers dehiscing centripetally, usually red; carpels 2-5, connate, walls cartilaginous in a fruit, ovules 2; styles 2-5, free. Fruit pyriform, turbinate or globose; flesh containing stone-cells.

1. Leaves more than $1\frac{1}{2}$ times as long as wide
Leaves not more than $1\frac{1}{2}$ times as long as wide

2. Fruit not more than 3.5 cm long, hard, usually not sweet-tasting
Fruit (5-) 6-16 cm long, fleshy, sweet-tasting

1. *P. pyrastrer* Burgod.
P. communis var. *ochras* Wallr.

Langas salvagg
Wild Pear

Tree 8-20 m high with patent or ascending, usually spiny branches. Twigs grey to brown. Bud-scales 5-8. Leaves 2.5-7 x 2-3 cm, elliptical, ovate or orbicular, cuneate, rounded or cordate at base, acute or shortly acuminate, thin, crenulate serrulate throughout or only at apex, rarely entire, usually glabrous at maturity, petiole 2-7 cm long, slender. Sepals 3-8 x 1-3.5 mm. Petals 10-17 x 7-13 mm, elliptical to orbicular. Fruit 1.3-3.5 x 1.8-3.5 cm, globose to turbinate, yellow brown or black, the lenticels often conspicuous; pedicel 1-5.5 cm long, slender, calyx persistent.

Sheltered valleys. *Malta*: cultivated and naturalised at San Martin, Ghajn il-Kbira, Wied Inċita (S. & C.G.; Borg); Wied Babu, Wied Xkora, Wied Dalam (Gulia; Borg); Buskett, Wied Bufula, Bahrija (Borg).

S. W. & C. Europe.

2. *P. amygdaliformis* Vill.
P. communis var. *amygdaliformis* (Vill.)

Round Pear

Shrub or small tree up to 6 m high; branches sometimes spiny. Twigs grey, dull, tomentose while young. Leaves 2.5-8 x 1-3 cm, narrowly lanceolate to obovate, usually entire, rarely 3-lobed, with rounded or cuneate base, sparsely hairy when young, papillose beneath at maturity; petiole 2-5 cm long. Sepals 5-6 x 1.5 mm, triangular-acuminate. Petals 7-8 x 5-6 mm, elliptical, usually emarginate at apex. Fruit 1.5-3 cm in diameter, usually globose, fulvous; pedicel stout, as long as or slightly longer than the fruit; calyx persistent. Fl. 2-4.

Rocky valleys. *Malta*: Wied Inċita, San Martin, Bahrija (Borg).

Mediterranean region.

3. *P. communis* L.

Plate XVI

Langasa
Cultivated Pear

Tree up to 20 m high; branches with or without spines, ascending on young trees and spreading on adult trees. Twigs stout, reddish-brown, soon becoming glabrous and shining. Leaves 5-8 x 3.5-5.5 cm, ovate and elliptical, more or less cuspidate at apex, crenulate-serrulate to subentire, usually glabrous at maturity, petiole equalling or shorter than lamina. Corymbs and leaves tomentose when unfolding. Sepals 6-8 x 3-4 mm, lanceolate, acuminate. Petals 12-14 x 10-12 mm, obovate. Fruit (5-) 6 x 4-12 cm long, oblong, pyriform, turbinate or subglobose, with a sweet taste; calyx persistent. Fl. 2-4.

More than a thousand cultivars of the garden pear are known. It is of hybrid origin, and many species are considered to be among its parents.

Malta and *Gozo*: commonly cultivated in many varieties (Borg).

Cultivated in many areas of the world.

2. amygdaliformis

1. pyrastrer
3. communis

8. Malus Miller

Deciduous rarely spiny shrubs or trees. Leaves simple, sometimes lobed. Flowers in umbels. Petals clawed, white, pink or red; stamens 15-50; anthers dehiscing centrifugally, yellow; carpels 3-5, connate, walls cartilaginous in fruit; ovules 2 or more; styles 2-5, connate at base. Fruit more or less globose; flesh usually without stone cells.

Mature leaves glabrous on both surfaces
Mature leaves tomentose, at least beneath

1. sylvestris
2. domestica

1. *M. sylvestris* Miller

Tuffich salvagg
Crab Apple

More or less spiny tree or shrub 2-10 m high. Leaves 3-11 x 2.5-5.5 cm, ovate, elliptical or suborbicular, crenate or serrate, with rounded or cuneate base, shortly apiculate, glabrous when mature; petiole 1.5-2 cm long. Flowers 3-4 cm in diameter, white or pink; sepals 3-7 mm long, glabrous externally, tomentose internally, styles glabrous or sparsely villous at base. Fruit 2.5-3 cm long, sub-glabrous, yellowish-green.

Malta: Occasionally cultivated as a stock for grafting (Borg).

Europe and S.W. Asia.

2. *M. domestica* Borkh.

Plate XVI

Tuffich ta' Billidja
Cultivated Apple

Unarmed small to medium-sized tree; twigs tomentose. Leaves 4-13 x 3-7 cm, ovate-elliptical, serrate, with rounded, rarely cordate base, slightly tomentose above and densely tomentose beneath. Fruit more than 5 cm long, varying in colour, sweet or acid, much longer than pedicel.

(The apple is of hybrid origin. More than a thousand cultivars are known.)

Malta and *Gozo*: cultivated and rarely self-sown (Borg).

Cultivated in many parts of the world.

9. Sorbus L.

Deciduous trees or shrubs, without spines. Leaves simple, lobed or pinnate. Flowers in compound corymbs. Petals white (rarely pink); stamens 15-25; carpels 2-5, partly free or connate, walls cartilaginous or membranous in fruit; ovules 2; styles free or connate at the base.

Bark shredding; styles 5; ripe fruit 20 mm or more long, greenish or brownish

1. domestica

Bark smooth; styles 3-4; ripe fruit less than 11 mm long, scarlet

2. aucuparia

1. *S. domestica* L.
Pyrus domestica Ehrh.

Zorba
Service tree

A tree up to 20 m high, with patent branches; bark shredding; leaves pinnate, with 6-8 pairs of leaflets; leaflets 3-4.5 cm long, oblong, serrate, pubescent beneath when young, finally glabrous. Flowers 16-18 mm in diameter, white; sepals trian-

gular, longer than wide; styles 5. Fruit 20 mm or more long, obovoid or pyriform, greenish or brownish, with numerous stone cells. Fl. 4-5.

Malta and Gozo: cultivated locally and naturalised at Wied il-Lunzjata [Dingli] (Borg).

S. Europe, extending northwards to C. Germany; planted for its fruit and for ornament elsewhere, and locally naturalised.

2. *S. aucuparia* L.

Pyrus aucuparia (L.) Ehrh.

Plate XVII

Rowan, Mountain Ash

Tree up to 15 (-20) m high, usually with erecto-patent branches; bark smooth. Leaves pinnate, with 5-7 pairs of leaflets; leaflets 2.5-6 (-9) cm long, oblong, serrate. Flowers 8-10 mm in diameter, white; sepals deltate, sometimes rounded; styles 3-4. Fruit 6-9 (-14) mm long, subglobose, depressed globose, or ovoid, scarlet, with few or no stone cells. $2n = 34$. Fl. 4-5.

Malta: Wied Żnuber (Penza); very rare, Wied Inċita, Hal Far (Borg).

West of Europe; W. Asia; N. Africa.

10. *Eriobotrya* Lindley

Evergreen shrubs or trees. Leaves simple. Inflorescence a terminal panicle. Sepals persistent in fruit; petals ovate or suborbicular, clawed, white; stamens 20; carpels 2-5, walls thin in fruit; ovules 2; styles connate only at base. Fruit with 1 or a few large seeds.

1. *E. japonica* (Thunb.) Lindley

Plate XVII

Naspli
Loquat

Small tree up to 10 m high. Leaves 12-25 cm long, obovate to elliptic-oblong, dentate, reddish-brown-tomentose beneath. Inflorescence densely reddish-brown tomentose. Flowers c. 1 cm in diameter; petals white to yellowish. Fruit 3-6 cm long, pyriform or ellipsoid, yellow; seeds 1-1.5 cm long. Fl. 10-12.

Malta and Gozo: cultivated since 1811, often naturalised in gardens (Borg; Wolseley).

Cultivated in S. Europe, tropical and subtropical Asia and America for its fruit; native of C. China.

11. *Mespilus* L.

Deciduous, sometimes spinose shrubs or small trees. Leaves simple. Stipules deciduous. Flowers solitary. Sepals longer than petals, entire, persistent; petals white; stamens 30-40, the anthers red; carpels 5, connate, the walls stony in fruit; ovules 2, styles 5, free. Fruit a large brown pome with foliaceous sepals.

1. *M. germanica* L.

Plate XVII

Fomm il-lipp o Naspli tedeschi
Medlar

Shrub or small tree up to 6 m high. Leaves 5-12 cm long lanceolate or oblanceolate to obovate, pubescent, but sometimes glabrous above, entire or serrulate towards the apex. Flowers 3-4 cm in diameter. Sepals 10-16 mm long, linear-triangular. Petals white. Fruit 2-3 cm long, pyriform to depressed-globose. Fl. 3-5.

Damp valleys. Malta: rare, Buskett (Gulia; Borg); Bahrija (Borg). Gozo: between Qala and Nadur (Reade; Borg); Qala and Fergla (Gulia; Borg).

S.E. Europe, extending to Sardegna and Sicilia; S.W. Asia; cultivated and naturalised elsewhere.

12. *Crataegus* L.

Deciduous usually spiny shrubs or small trees. Leaves simple, lobed or pinnatifid, serrate. Stipules persistent. Flowers in corymbs. Petals obovate, white, rarely pink; stamens 5-25; carpels 1-5, free on the ventral side, walls stony in fruit; styles 1-5; ovules 2. Fruit usually with mealy flesh, red, yellow or black; pyrenes 1-5.

Twigs, pedicels and hypanthium glabrous or with straight patent hairs

1. *monogyna*

Twigs, pedicels and hypanthium densely tomentose

2. *azarolus*

1. *C. monogyna* Jacq.

Zagħrun,

C. oxyacantha L.

Hawthorn

Shrub or small tree up to 10 m high; spines 7-20 mm long. Leaves obovate to rhombic, cuneate, discolorous; lobes 3-7, oblong, acute or subobtusate, entire or sparsely toothed near the apex, extending $\frac{1}{2}$ of the way to the midrib, the sinuses usually open and deep; stipules entire, lanceolate-subulate. Flowers 3-15 mm in diameter. Style 1. Fruit 6-10 mm long, dark or bright red, crowded by deflexed sepals which are usually slightly longer than wide; pyrene 1. Fl. 3-5.

Valley bottoms. Malta: frequent (G. Lanfranco), as at Ta' Baldu, Wied Ghomor, Wied Qirda, Għirgenti (S. & C.G.; Borg); Wied Babu, Wied Ballut (G.D.); Buskett, Wied Inċita, Għajn il-Kbira, Wied Hażrun (Borg; Wolseley); Mellieha (Borg; Kramer & Westra). Gozo: Xlendi (S. & C.G.; Borg); Għirgenti (Penza).

West of Europe; Mediterranean region; W. Asia.

2. *C. azarolus* L.

Plate XVII

Crete Hawthorn
Għanzalori

Shrub; twigs tomentose; spines few. Leaves 30-50 x 25-40 mm, rhombic to obovate-oblong, cuneate, coriaceous, subglabrous or glabrous, glossy green above, lobes 3 (-5), subobtusate, entire; petiole up to 12 mm; stipules falcate, coarsely serrate. Hypanthium and pedicels densely tomentose. Corymb of flowers lax, glabrescent; flowers 13-16 mm in diameter; sepals shortly acuminate; styles 1-2 (-3). Fruit 1-1.5 cm in diameter, globose to pyriform, brick-red to yellowish-orange, crowned by deflexed sepals; pyrenes 3-5. Fl. 3-4.

Valley bottoms. Malta: Wied Qirda, Wied Babu, Ta' Baldu (S. & C.G.; Borg); Buskett, Wied il-Kbir, Għirgenti (Borg); Wied Anġlu (Wolseley). Gozo: Mgarr ix-Xini (S. & C.G.; Borg); Xlendi (Kramer & Westra; Wolseley).

Cultivated for its edible fruits in S. Europe; native of Crete.

Subfam. PRUNOIDEAE

Stipules present, often small and caducous. Flowers 5-merous. Hypanthium concave or tubular with a single free carpel at the base; epicalyx absent; stamens numerous. Fruit a 1-seeded drupe.

13. *Prunus* L.

Trees or shrubs. Leaves simple, usually crenate or serrate, petiolate. Stipules free, narrow, more or less scarious, often deciduous. Flowers 5 merous, solitary or in clusters, umbels, corymbs or racemes. Petals pink or white.

- | | |
|--|---------------------|
| 1. Ovary and fruit hairy | |
| Ovary and fruit glabrous | |
| 2. Leaves broadly ovate to suborbicular, convolute in bud | 3. <i>armeniaca</i> |
| Leaves at least twice as long as wide, longitudinally folded in bud | |
| 3. Petals usually deep pink through anthesis; mesocarp succulent; endocarp \pm globose, deeply sulcate | 1. <i>persica</i> |
| Petals white or pale pink when expanded; mesocarp coriaceous; endocarp compressed, pitted | 2. <i>dulcis</i> |
| 4. Flowers in short corymbs of 3-10 | 7. <i>mahaleb</i> |
| Flowers solitary or in clusters or umbels | |
| 5. Pedicel at least twice as long as ripe fruit; flowers in sessile umbels with many bud scales at base of umbel | 6. <i>cerasus</i> |
| Pedicels shorter than ripe fruit; flowers solitary or in clusters without bud scales at base of cluster | |
| 6. Petals pink | 1. <i>persica</i> |
| Petals white | |
| 7. Bark blackish; fruit 10-15 mm long, more or less erect; flowers solitary, appearing before leaves | 4. <i>spinosa</i> |
| Bark brownish; fruit 20 mm long or more, pendulous; flowers in clusters of 2-3, appearing with the leaves | 5. <i>domestica</i> |

Subgen. *Amygdales* (L.) Focke

Deciduous; leaves longitudinally folded in bud. Shoots with terminal bud. Flowers subsessile in clusters of 1-3, appearing before the leaves on shoots of the previous year's growth, each flower-bud flanked by 2 leaf buds. Fruit usually pubescent or tomentose; endocarp sulcate or pitted.

1. *P. persica* (L.) Batsch

Haywa
Peach

Tree up to 6 m high, with straight, glabrous, reddish, angular twigs. Leaves 5-15 x 2-4 cm, oblong-lanceolate, acute to acuminate, serrulate, glabrescent. Flowers subsessile, mostly solitary; hypanthium about as wide as long; sepals tomentose; petals 10-20 mm long, deep (rarely pale) pink. Fruit 40-80 mm long, velutinous (glabrous in var. *nuttipersica* (Borkh) C.K. Schneider, the Nectarine *Nucipersika*) - yellow or pale green, tinged with red; mesocarp succulent, pale green or orange; endocarp deeply sulcate. Fl. 3-4.

Malta, Gozo and Comino: cultivated extensively for its fruits, both as a field crop and in gardens (Borg; Wolseley).

Extensively cultivated in S. & S.C. Europe, and many other parts of the world; locally naturalised; native of China.

2. *P. dulcis* (Miller) D.A. Webb
P. amygdalus Batsch

Lewza fghira
Almond

Shrub or tree up to 8 m high, in wild plants spiny and intricately branched, in cultivated plants with straight spineless branches. Leaves 4-12 x 1.2-3 cm, oblong-lanceolate, crenate-serrate, glabrous. Flowers mostly in pairs; hypanthium broadly campanulate; sepals tomentose at least on the margin; petals c. 20 mm long, bright pink in bud, fading to pale pink or almost white. Fruit 35-60 mm long, ovoid-oblong, compressed, tomentose, grey-green; mesocarp coriaceous, eventually splitting and separating away from the finely pitted, beaked endocarp. Fl. 12-2.

Malta, Gozo and Comino: frequently cultivated for its edible seeds and often naturalised in the valleys (Borg; Wolseley).

Extensively cultivated and frequently naturalised in the Mediterranean region; native of C. and S.W. Asia.

Subgen. *Prunus*

Deciduous; leaves convolute in bud. Shoots without terminal bud. Flowers subsessile or shortly pedicellate, solitary or in small, axillary clusters; flower bud without accompanying leaf buds. Hypanthium broadly campanulate. Fruit usually glabrous, often pruinose; mesocarp succulent; endocarp smooth or somewhat rugose.

3. *P. armeniaca* L.

Sergium
Apricot

Shrub or small tree 3-6 (-10) m high, glabrous except for the flower and fruit; young twigs and young leaves reddish. Leaves 5-10 x 5-8 cm, broadly ovate to suborbicular, acuminate to cuspidate, serrate, truncate or subcordate at the base; petiole 2-4 cm long. Flowers subsessile, solitary or in pairs, appearing before the leaves; hypanthium and calyx hairy; petals 10-15 mm long, white or very pink. Fruit 4-8 cm long, subglobose, velutinous, reddish-orange to yellow; mesocarp orange-yellow; endocarp lenticles smooth, with 3 narrow ridges along the margin. Fl. 3-4.

Malta and Gozo: frequently cultivated for its edible fruits and often found self sown (Borg).

Cultivated as a field crop in S. & S.C. Europe, locally naturalised; native of C. Asia and China.

4. *P. spinosa* L.

Pruna salvaggia
Prun lax-owic
Blackthorn, Sloe

Dense shrub up to 4 m high, spreading by suckers and with numerous, divaricate, intricate, spiny branches; bark blackish; young twigs usually pubescent. Leaves 2-4 cm long, obovate to oblanceolate, finely crenate or serrate, cuneate at the base, dull green and glabrous above, usually pubescent on the veins beneath. Flowers mostly solitary, appearing before the leaves, very numerous; pedicels c. 5 mm long, glabrous; petals 5-8 mm long, white. Fruit 10-15 mm long, globose, erect, bluish-black, very pruinose, acid and astringent;

endocarp subglobose, smooth or slightly rugose, stone 7.5-10 x 6-8 mm, nearly globose. $2n = 32$. Fl. 2-4.

Gardens and occasionally in valleys (Borg). Malta: Buskett, Girgenti, Zurrieq (S. & C.G.). Gozo: Pergla (Gulia).

Europe except the extreme north; Mediterranean region to S.W. Siberia.

Plate XVII

Pruna
Plum

5. *P. domestica* L.

Shrub or tree up to 10 m high, in cultivated plants with straight spineless branches, but in wild plants often somewhat spiny, often spreading by suckers; bark dull brown; young twigs dull, usually pubescent. Leaves 3-8 x 1.5-5 cm, obovate to elliptical, crenate-serrate, glabrous and dull green above, densely pubescent to subglabrous beneath. Flowers usually in clusters of 2-3, appearing with the leaves; pedicel 5-20 mm long; petals 7-12 mm long, white. Fruit 20-75 mm long, globose to oblong, usually pendulous; purple, red, yellow or green, sweet or acid, not astringent; endocarp somewhat rugose. Fl. 3-4.

The numerous cultivars and very variable naturalised plants are arranged in 2 subspecies: *subsp. domestica* (subsp. *oeconomica* (Borkh.) C.K. Schneider) which comprises the plums; and *subsp. insititia* (L.) C.K. Schneider (incl. *P. domestica* subsp. *italica* (Borkh.) Hegl) which comprises the damsons and greengages. Subsp. *domestica* has subglabrous young twigs and pedicels and the endocarp is compressed and keeled, subsp. *insititia* has densely pubescent young twigs and pedicels and the endocarp is subglobose and scarcely keeled.

Cultivated occasionally naturalised (Borg). Malta: Wied tal-Isqof (Gauci). Gozo: Xlendi (Wolseley).

Cultivated as a crop in many parts of the world and widely naturalised.

Amarena
Dwarf Cherry

6. *P. cerasus* L.

Usually a shrub, rarely a tree up to 8 m high, with ill defined trunk, suckering freely. Bark smooth, reddish-brown, peeling off in paper-like strips. Leaves 8-15 x 4-7 cm, obovate-oblong, acuminate, crenate-serrate with deep but obtuse teeth, glossy above, glabrescent beneath; petiole 1-3 cm long, rarely with 2 conspicuous glands at the top. Flowers in sessile umbels of 2-6, with many bud scales at the base with leaf-like tip; pedicels 2-5 cm long; hypanthium broadly campanulate. Fruit 9-12 mm long, globose, bright red, acid. Fl. 3-4.

Naturalised in valleys and gardens. Malta: Għajn il-Khira, Buskett, Mollieha, Buhrija, Burnuhala (Borg). Gozo: Xlendi, Nadur (Borg).

Widely cultivated for its fruit and sometimes for hedges; often naturalised origin S.W. Asia.

Mahaleb Cherry

7. *P. mahaleb* L.

Shrub, or rarely small tree, up to 10 m high; young twigs glandular, puberulent. Leaves 4-7 cm long, broadly ovate, cuspidate, rounded to subcordate at the base, crenate-serrate with conspicuous marginal glands, glabrous or slightly pubescent beneath. Flowers fragrant, in short, corymbose racemes of

3-10, which terminate short, lateral, leafy shoots; pedicels c. 10 mm long; hypanthium campanulate. Petals 5-8 mm long, white. Fruit 8-10 mm long, ovoid, black; mesocarp thin, bitter; endocarp smooth. Fl. 3-4.

Dry hillsides. Malta: introduced in 1905, naturalised in the Buskett valley (Borg).

C. & S. Europe; W. Asia; naturalised in N. America.

XXXVII LEGUMINOSAE

Trees, shrubs or herbs. Leaves alternate, rarely opposite, simple to 2-pinnate, stipulate. Flowers usually hermaphrodite, usually 5-merous. Sepals usually united. Petals free or somewhat connate. Stamens usually 10, sometimes less than 10 or numerous. Ovary a single unilocular carpel; style 1. Fruit a dehiscent, 2-valved or indehiscent, occasionally lomentaceous legume. Seeds usually without endosperm.

A large number of species, both native and introduced, are cultivated for food, fodder and for ornament. Those most frequently utilised as food are to be found in *Cicer*, *Lens*, *Phaseolus*, *Pisum* and *Vicia*. The edible part is usually the seed or legume or both. Species of these genera and many others, particularly *Anthyllis*, *Ceratonia*, *Coronilla*, *Lathyrus*, *Lotus*, *Medicago*, *Melilotus*, *Scorpiurus*, *Trifolium* and *Trigonella* are cultivated (about 12,000 acres) for fodder or planted to improve pasture.

Cultivated ornamental plants are to be found in the majority of European genera.

- | | | |
|---|---------------------|-----------|
| 1. Stamens numerous, free, longer than the corolla
Stamens not more than 10, the filaments often partly or completely united, usually shorter than the corolla | 3. <i>Acacia</i> | 2. |
| 2. Corolla absent; stamens 5, free
Corolla present; stamens more than 5 or filaments united | 2. <i>Ceratonia</i> | 3. |
| 3. Leaves consisting of a tendril only (but with large leaf-like stipules)
Leaves not consisting of a tendril only | 13. <i>Lathyrus</i> | 4. |
| 4. At least some leaves paripinnate, imparipinnate or digitate; leaflets 2, 4 or more
Leaves simple, 1-foliate or 3-foliate (at least in the upper leaves) | | 5.
25. |
| 5. Leaves paripinnate, rachis often ending in a spine or tendril
Leaves imparipinnate or digitate | | 6.
11. |
| 6. Stem and leaves glandular-pubescent
Stem and leaves not glandular-pubescent | 10. <i>Cicer</i> | 7. |
| 7. Stem winged
Stem not winged | 13. <i>Lathyrus</i> | 8. |
| 8. Leaflets parallel-veined
Leaflets pinnately-veined | 13. <i>Lathyrus</i> | 9. |

9. Calyx-teeth all equal and at least twice as long as the tube
At least 2 calyx-teeth less than twice as long as the tube
10. Calyx-teeth not leaf-like; stipules not more than 2 cm long
Calyx-teeth more or less leaf-like; stipules up to 10 cm long
11. Principal lateral veins of the leaflets terminating at the margin, often in a tooth
Lateral veins of the leaflets anastomosing and not reaching the margin
12. Variously hairy and glandular, sometimes sparsely so
Glabrous or glabrescent, eglandular
13. Racemes pendulous, 10-20 cm long
Racemes erect; not more than 10 cm long
14. Flowers in umbels or clusters, the pedicels arising from the same point
Flowers in racemes, or condensed panicles, or solitary
15. Legume lomentaceous
Legume dehiscent or indehiscent, not lomentaceous
16. Keel obtuse; legume strongly reticulate-veined
Keel acute; legume not or only faintly reticulate-veined
17. Segments of the legume linear or oblong, straight or slightly curved
Segments of the legume lunate, or horseshoe-shaped to rectangular with a semicircular to orbicular sinus which has a curved protuberance at its base.
18. Keel not beaked
Keel beaked
19. All leaves with 2 pairs of leaflets; legume linear or oblong, straight or curved
Lower leaves simple; upper leaves with 2-3 pairs of leaflets; legume spirally twisted and flattened so that it is circular in outline
20. Leaflets distinctly parallel-veined
Leaflets pinnately veined or the lateral veins obscure
21. Legume lomentaceous
Legume not lomentaceous
22. Flowers solitary, axillary
Racemes (2-) 4- to many-flowered

12. Lens

11. Vicia

14. Pisum

10. Cicer

19. Trifolium

5. Robinia

24. Ornithopus

25. Coronilla

26. Hippocrepis

7. Astragalus

20. Lotus

22. Hymenocarpus

13. Lathyrus

26. Hippocrepis

28. Herdysarum

23. Leaves paripinnate, usually with a tendril at least on the upper leaves
Leaves imparipinnate, without a tendril
24. Leaves with 6-11 pairs of leaflets and a terminal leaflet
Leaves with 5 leaflets
25. Leaves 7-12 cm long, simple, suborbicular, cordate; adaxial petal innermost
Leaves 3-foliolate or simple, but never suborbicular and cordate; adaxial petal outermost
26. Principal lateral veins of the leaflets terminating at the margin; leaflets often toothed
Principal lateral veins of the leaflets anastomosing and not reaching the margin, sometimes obscure; leaflets not toothed (leaves sometimes caducous or reduced to spine-tipped phyllode)
27. Plant glandular-pubescent at least above
Plant not glandular-pubescent
28. Stamens monadelphous; legume straight or very slightly curved
Stamens diadelphous; legume falcate to spirally coiled
29. At least some petal-claws adnate to the staminal tube; corolla usually persistent in fruit
Petal claws free from the staminal tube; corolla deciduous
30. Filaments of at least 5 stamens dilated at the apex
Filaments all filiform
31. Legume coiled in 1 or more turns of a spiral
Legume straight or curved
32. Perennial
Annual
33. Legume obovate or ovate to subglobose
Legume oblong, oblong-falcate, oblong-reniform, reniform or variously curved
34. Corolla blue
Corolla white or yellow
35. Legume linear or oblong, at least 3 times as long as wide
Legume ovate or obovate to subglobose or reniform, less than 3 times as long as wide
36. Spiny shrub
Plant not spiny
37. Leaflets stipellate; leaves 3-foliolate
Leaflets not stipellate; leaves simple or 3-foliolate

11. Vicia

7. Astragalus

20. Lotus

1. Cercis

15. Ononis

18. Medicago

19. Trifolium

19. Trifolium

18. Medicago

16. Melilotus

18. Medicago

17. Trigonella

17. Trigonella

18. Medicago

23. Anthyllis

9. Phaseolus

38. Leaves simple or 1-foliolate, sometimes very small
At least some leaves 3-foliolate
39. Shrubs or perennial herbs woody at base
Annual herbs
40. Leaves linear, grass-like; legume dehiscent
Leaves obovate or elliptical, not grass-like; legume indehiscent

41. Leaflets conspicuously glandular-punctate
Leaflets not or very minutely glandular-punctate

42. Legume lomentaceous
Legume not lomentaceous

43. Shrubs or trees
Herbs

44. Calyx inflated, 4.5-6 mm wide in flower, up to 12 mm wide in fruit and enclosing the legume
Calyx less than 4.5 mm wide, not inflated

45. Stipules inserted at the base of the petiole; legume not longitudinally winged

Stipules inserted on the stem and adnate to the base of the petiole; legume with 2 or 4 longitudinal wings

Subfam. CAESALPINIOIDEAE

Flowers more or less zygomorphic. Sepals and petals imbricate; the adaxial petal innermost and so overlapped by the lateral petals. Stamens usually not more than 10, free (in European species).

1. *Cercis* L.

Deciduous trees or shrubs. Leaves simple, digitately veined; stipules small, caducous. Flowers fasciculate (in European sp.) hermaphrodite. Calyx campanulate with 5 equal teeth; corolla strongly zygomorphic, the 3 upper petals much smaller than the lower 2; stamens 10. Legume linear-oblong compressed, narrowly winged on the ventral suture, more or less dehiscent. Seeds usually numerous.

Plate XVIII

Is-sigra Guda
Judas Tree

1. *C. siliquastrum* L.

Tree up to 10 m high, cauliflorous. Leaves 7-12 cm long, suborbicular obtuse or emarginate, cordate, glabrous, long-petiolate. Corolla 15-20 mm long, pinkish-purple. Legume 6-10 x 1.5-2 cm, brown, glabrous. Fl. 3-5.

Malta: Cultivated for its flowers and occasionally naturalised as at Floriana, Porte des Bombes, Msida Valley, Ghajn Rihana (Valletta; Wolseley); Attard (Wolseley). Gozo: Ghajnsielom (Valletta).

Mediterranean region extending to E. Bulgaria; cultivated elsewhere for ornament and sometimes naturalised.

2. *Ceratonia* L.

Polygamous or dioecious. Evergreen trees or shrubs. Leaves pari-pinnate; stipules minute, caducous. Flowers in short, axillary racemes. Calyx with 5 short, caducous

5. *Spartium*

13. *Lathyrus*

26. *Scorpiurus*

8. *Psoralea*

25. *Coronilla*

4. *Anagyris*

23. *Anthyllis*

20. *Lotus*

21. *Tetragonolobus*

teeth; petals 0; stamens 5. Legume linear-oblong, compressed, indehiscent with a sugary pulp between the seeds. Seeds numerous.

1. *C. siliqua* L.

Plate XVIII

Harruba
Carob

Tree or shrub up to 10 m high. Leaflets 2-5 pairs, 30-50 x 30-40 mm, elliptical or obovate to suborbicular, coriaceous, dark green and shining above, pale green beneath. Flowers green. Legume 10-20 x 1.5-2 cm, brownish-violet, pendulous. Fl. 10-11.

Malta, Gozo and Comino: commonly cultivated (S. & C.G.; Borg; G. Lanfranco; Wolseley), and often associated with farmsteads on the coralline formations; naturalised elsewhere where it is protected from goats by valleys and precipices (Wolseley).

Native to the Mediterranean region, but also extensively cultivated for fodder and widely naturalised, so that the limits as a native tree are hard to determine.

Subfam. MIMOSOIDEAE

Flowers actinomorphic. Sepals and petals valvate. Stamens numerous, free.

3. *Acacia* Millier

Trees or shrubs. Leaves 2-pinnate and dorsiventral in the juvenile state and remaining so in the adult state or some reduced to simple phyllodes; stipules rudimentary or becoming large spines. Flowers small, yellow to white, in cylindrical spikes or in globose capitula arranged in racemes or panicles; calyx and corolla 4- to 5-merous; stamens numerous, free, long and conspicuous. Legume usually dehiscent. Seeds with a filiform funicle ending in a cupuliform strophiole.

1. *A. cyanophylla* Lindley

Blue-leaved Acacia

Tree up to 10 m high; bark smooth, grey, later greyish brown and fissured. Twigs glaucous, pendulous. Phyllodes 10-20 (-35) x 0.6-2 (3) cm (up to 8 cm wide, ovate-undulate on suckers), linear to lanceolate, not or scarcely falcate, subacute, more or less glaucous, 1-veined. Capitula 10-15 mm in diameter, in short racemes of 2-6. Flowers bright yellow. Legume 80-120 x 4-8 mm, compressed, distinctly constricted between the seeds, glaucous when young, later brownish. Funicle short, whitish. Fl. 3-4.

Malta: widely cultivated in gardens, and also in plantations.

Native of western Australia.

Subfam. LOTOIDEAE

Flowers zygomorphic. Sepals and petals imbricate; the adaxial petal (standard) outermost, the 2 lateral petals (wings) free, the 2 lower petals innermost and usually partially adhering to each other by means of interlocking hairs on the margin to form the keel. Stamens 10, rarely 5, free, or more usually all or 9 of the filaments united.

4. *Anagyris* L.

Shrubs. Leaves 3-foliolate; stipules connate, leaf-opposed. Flowers in short axillary racemes. Calyx campanulate, sub-bilabiate, stamens free. Legume stipitate, constricted and septate between the seeds, compressed, dehiscent. Seeds few.

Foetid shrub up to 4 m high. Leaflets 30-70 x 10-30 mm, elliptical or lanceolate-elliptical, sub-obtuse, mucronulate; stipules c. 5 mm long. Corolla 18-25 mm long, yellow, the standard much shorter than the wings and keel, often with a black spot. Legume 10-20 x 1.5-2 cm. Seeds violet or yellow. Fl. 12-3.

Rocky valleys. *Malta*: rare (G. Lanfranco), as at Wied il-Ghasel, Wied il-Madliena, Mthleeb, Buskett (S. & C.G.; Borg); Wied Qirida (Godfrey; S. & C.G.; Borg); Wied il-Luk (Borg; S. & C.G.); Bahrija, Mtarfa (Borg); Wied Anglu, Wied Host (Wolseley); Ghallis (Gauchi). *Gozo*: Kerem (Kramer & Westra).

Mediterranean region to Arabia.

5. *Spartium* L.

Unarmed shrubs. Leaves 1-foliolate. Flowers in lax, terminal, leafless, many-flowered racemes. Calyx spathe-like, split above, irregularly unilabiate (rarely bilabiate), with 5 short teeth; corolla yellow; stamens monodelphous. Legume linear-oblong, dehiscent, subseptate between the seeds. Seeds numerous, estrophiolate.

1. *S. junceum* L.

Plate XVIII

Genista safra
Spanish Broom

Shrub up to 3 m high (or more in cultivation). Branches cylindrical, striate, medullated, flexible, glaucous-green, glabrous. Leaves 10-30 x 2-5 mm, sparse, oblong-linear to lanceolate, glabrous above, appressed-sericeous beneath, subsessile, caducous. Flowers showy, sweet-scented, borne singly. Pedicels with a small caducous bract at the base and two bracteoles at the apex. Corolla 20-25 mm long. Legume flat, sericeous, becoming glabrous. Seeds 10-18. Fl. 4-5.

Rocky valleys. *Malta*: rare, Ghajn il-Kbira (Borg; Penza); Buskett at il-bosk (Gauchi). *Gozo*: Mgarr ix-Xini (S. & C.G.; Borg).

Mediterranean region and Canary Islands; cultivated and naturalised elsewhere.

6. *Robinia* L.

Deciduous trees or shrubs. Leaves imparipinnate; stipels often present; spinose stipules usually present. Flowers in pendulous, axillary racemes; calyx campanulate, slightly bilabiate; corolla white, pink or purple; stamens diadelphous. Legume linear to oblong, compressed, dehiscent. Seeds 3-10.

1. *R. pseudacacia* L.

Plate XVIII

Robinja
False Acacia

A deciduous tree up to 27 m high. Leaflets 3-10 pairs, 25-45 x 12-25 mm, elliptical or ovate, glabrous or subglabrous; usually with stipular spines. Racemes 10-20 cm long, many-flowered. Corolla 15-20 mm long, white, the base of the standard yellow. Legume 5-10 x c. 1 cm, glabrous.

Malta: cultivated and naturalised in gardens as at San Anton, Buskett, and Argotti (Borg; Wolseley).

Native of C. and E. North America; widely planted and extensively naturalised through much of Europe.

7. *Astragalus* L.

Annual or perennial herbs or small shrubs. Leaves imparipinnate or paripinnate, sometimes terminating in a spine; leaflets entire. Flowers in racemes or axillary clusters, sessile or pedicellate. Calyx infundibuliform, tubular or campanulate, sometimes inflated in fruit, with distinct, equal or unequal teeth; keel not mucronate at apex (very rarely adaxially mucronate); stamens 10, diadelphous (very rarely 5, monadelphous); stigma and style glabrous. Legume usually dehiscent, very varied in shape and texture, glabrous or hairy, unilocular to bilocular. Seeds 1-many.

1. Legume 7-15 mm long; stems procumbent
Legume 20-50 mm long; stems erect

2. *sesameus*

2.

2. Legume more or less straight, not laterally compressed, valves keeled; hairs on stems and leaves modified, one arm shorter than the other
Mature legume curved in a semicircle, laterally compressed, valves not keeled; hairs on stems and leaves simple, basifixed

1. *boctiens*3. *hamosus*1. *A. boctiens* L.

Plate XIX

Kafe Messikan
Yellow Milk-vetch

Stems up to 60 cm high, ascending or erect. Leaves 2-10 cm long; leaflets 6-10 pairs, ovate or obovate, emarginate, densely hairy beneath, sparsely so above. Peduncles half as long as leaves; racemes dense with 5-15 flowers. Calyx c. 5 mm long, the teeth as long as the tube. Corolla yellow, standard 12-14 mm long; wings longer than keel. Legume 20-40 x (3-) 7-8 mm, oblong, triangular in transverse section, grooved beneath; beak hooked; valves keeled, with short appressed hairs. Fl. 3-5.

Valleys and fallow fields. *Malta* and *Gozo*: frequent (S. & C.G.; GD; Borg; G. Lanfranco; Wolseley). *Comino*: (S. & C.G.; Borg).

Mediterranean Region; W. Asia; Madeira.

2. *A. sesameus* L.

Small-flowered Milk-vetch

Stems up to 30 cm high, procumbent or ascending. Leaves 2-8 cm long; leaflets 9-11 pairs, oblong to obovate, obtuse or emarginate, sparsely hairy on both surfaces. Peduncles half as long as to slightly longer than leaves, racemes dense, subsessile, with 5-10 flowers. Calyx 5-6 mm long, the teeth as long as the tube. Corolla yellowish, standard 8-9 mm, sometimes bluish. Legumes (7-) 10-15 x 3-4 mm, strictly erect, lanceolate, almost straight, laterally compressed, scarcely dorsiventrally compressed at base; beak c. 2 mm, curved; valves with appressed hairs. Fl. 3-4.

Waste ground and rocky arid places. *Malta* and *Gozo*: frequent along country roads. (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Cominotto*: (Duthie; Borg).

C. & W. Mediterranean region extending to S. Portugal and S. Bulgaria; N. & W. Africa.

3. *A. hamosus* L.

Southern Milk-vetch

Stems up to 60 cm high. Leaves 5-10 (-15) cm long; leaflets 9-11 pairs, oblong-obovate, emarginate or truncate, hairy beneath, glabrous or subglabrous

above. Peduncles half as long as leaves; racemes fairly dense, with 5-14 flowers. Calyx 5-6 mm long. Corolla yellow; standard 7-8 mm long; stamens 10. Legume 20-50 x 2-3 mm, linear, acuminate at apex, curved for about a semicircle, laterally compressed; beak short; valves not keeled, almost smooth, with short appressed hairs. Fl. 2-5.

Fields among crops, gardens and waste ground. *Malta, Gozo and Comino*: common (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Cominotto*: (Duthie; Borg).

Mediterranean Region; C. & W. Asia; Canary Islands.

8. *Psoralea* L.

Perennial herbs or shrubs. Leaves trifoliate (in European species), glandular-punctate; stipules small, free. Flowers in axillary heads or racemes, with a pair of 3-fid bracts at the base. Calyx campanulate, with 5 unequal teeth; corolla blue-violet to white; keel obtuse; stamens monadelphous. Legume indehiscent; 1-seeded.

1. *P. bituminosa* L.

Plate XIX

Silla qatanija
Silla salvaġġa
Blue Psoralea

Stems 20-100 cm high, sparsely to densely pubescent, smelling of bitumen. Leaflets 10-60 x 3-20 (-30) mm, linear-lanceolate to ovate-orbicular, entire. Flowers in heads; the peduncles usually longer than the leaves. Corolla 15-20 mm long, blue-violet. Legume ovoid, compressed, with a falcate beak up to 15 mm long. Fl. 2-5.

Malta, Gozo and Comino: very common everywhere (S. & C.G.; Borg; Wolseley).
Mediterranean region; W. Asia; Canary Islands.

9. *Phaseolus* L.

Annual or perennial, usually climbing herbs. Leaves 3-foliate; stipels present; stipules small. Flowers in axillary racemes. Calyx campanulate, bilabiate; corolla variously coloured; keel with a spirally coiled beak; stamens diadelphous; style hairy on the inside; stigma oblique. Legume linear-oblong, dehiscent. Seeds usually numerous.

1. *P. vulgaris* L.

Fażola
French Bean

Annual up to 4 m high. Leaflets 5-10 x 4-6 cm, ovate-orbicular, acuminate. Racemes shorter than leaves, up to 6-flowered. Corolla 10-18 mm long, white, pink or purple; beak of keel forming 2 turns of a spiral. Legume up to 50 x 2.5 cm, brown. Fl. 4-9.

Malta and Gozo: extensively cultivated in many varieties (Borg, Wolseley). First recorded in the Tarxien Cemetery deposits of the bronze-age (Trumps, 1966).

Native of S. America; cultivated in many parts of the world.

10. *Cicer* L.

Annual or perennial herbs with glandular hairs. Leaves usually imparipinnate, rarely paripinnate and terminated by a tendril; stipules herbaceous. Flowers solitary or in axillary racemes. Calyx gibbous at base, bilabiate, but sometimes

the teeth subequal; corolla white or violet; stamens diadelphous; style glabrous. Legume ovate or oblong, dehiscent. Seeds 1-4.

1. *C. arietinum* L.

Plate XIX

Ċiċri
Chick-pea

Erect, pubescent annual 20-50 (-100) cm high. Leaves imparipinnate; leaflets 3-8 pairs, 8-18 x 3-10 mm, ovate or elliptical, deeply toothed. Peduncles shorter than leaves, 1-flowered. Calyx slightly gibbous at base, the teeth subequal, at least twice as long as the tube; corolla 10-12 mm long, pale purple or white. Legume 20-30 x 10-15 mm. Seeds 1-2. Fl. 4-5.

Malta and Gozo: dry farmed for the seeds which are used green as a vegetable, dried for forage, or roasted for use as coffee (Borg).

Probably native of S.W. Asia; cultivated throughout the Mediterranean Region.

11. *Vicia* L.

Annual or perennial herbs, often climbing by means of tendrils. Leaves paripinnate, usually with a tendril, very rarely imparipinnate; stipules usually small, herbaceous. Flowers solitary, axillary or in axillary fascicles or racemes. Calyx actinomorphic to bilabiate; keel obtuse; stamens diadelphous; style pubescent all round or on the lower side, or glabrous. Legume more or less oblong, compressed, dehiscent. Seeds usually 2 or more.

Several species in this genus are important fodder plants. The most frequently utilised are 4, 10, 14, 15 but many other species are cultivated locally, especially in S. Europe.

1. Inflorescence sessile or with peduncle shorter than flowers

Inflorescence pedunculate, the peduncle much longer than the flowers

2. Standard pubescent on the back

Standard glabrous on the back

3. All leaves without a tendril, the rachis terminated by a short mucro; legume 80 mm long or more
At least the upper leaves with a tendril

4. Mouth of the calyx-tube oblique or the calyx-teeth unequal, the lowest tooth much longer than the upper tooth

Mouth of the calyx-tube not oblique, the calyx teeth equal or subequal

5. Standard yellow sometimes suffused with purple; wings yellow sometimes with black tip
Standard and wings purple

6. Leaflets not more than 3 mm wide, linear, usually with 3 acute points at the apex.
lanceolate, obtuse or emarginate, mucronate

Leaflets at least 4 mm wide, ovate, elliptical or

9. *pannonica*

15. *faba*

12. *lutea*

11. *peregrina*

14. *narbonensis*

7. Leaflets of the upper leaves 3-many pairs; wings and keel purple
Leaflets 1-3 pairs; wings and keel whitish

8. Calyx-teeth equal, all equalling or longer than tube
Calyx-teeth unequal, at least the upper shorter than tube

9. Leaves without a tendril; legume torulose
At least the upper leaves with a tendril; legume not torulose

10. Corolla 2-4 (-5) mm long; seeds usually 2
Corolla 6-10 mm long; seeds 3-6

11. Corolla 5-9 mm long; whitish or pale purple; racemes 1- to 8-flowered
Corolla 9 mm or more, rarely smaller and then violet; racemes 10- to 40-flowered

12. Racemes (1-) 2- to 5-flowered, longer than leaves; hilum $1/12$ - $1/2$ of the circumference of the seed
Racemes 1- or 2-flowered, about equalling leaves; hilum $1/2$ of the circumference of the seed

13. Stipules denticulate to serrate or bipartite
Stipules entire

14. Stipules denticulate to serrate, not bipartite; racemes usually longer than leaves
Stipules bipartite; racemes shorter than leaves

15. Calyx only slightly gibbous at base; limb of the standard usually as long as or longer than the claw
Calyx strongly gibbous at base; limb of the standard about $1/2$ as long as the claw

Sect. *Cracca* S.F. Gray. Leaflets usually numerous (more than 5 pairs); flowers usually numerous in long-pedunculate racemes; calyx bilabiate, somewhat gibbous at base; corolla usually large (more than 10 mm long); style equally pubescent all round.

1. *V. onobrychoides* L.

Saintfoin Vetch

Glabrous or pubescent perennial 30-120 cm high. Leaflets 4-11 pairs, 10-35 x 1-4 mm, linear or oblong-lanceolate; stipules entire or with few teeth. Racemes 5 to 15-flowered. Calyx-teeth unequal, the lower equalling the tube; corolla 17-24 mm long, violet with pale keel. Legume 25-40 x 5-7 mm, reddish-brown, glabrous, stipitate. Seeds 5-10; hilum $1/2$ - $1/3$ of the circumference. Fl. 3-4.

Malta: rare and probably accidental in San Anton and other gardens in the neighbourhood (Borg).

Mediterranean region.

10. *sativa*
13. *bithynica*

4. *ervilia*

6. *hirsuta*
8. *leucantha*

7. *tenuissima*
8. *tetrasperma*

1. *onobrychoides*
3. *monantha*

1. *onobrychoides*
2. *villosa*

2. *V. villosa* Roth.

Fodder Vetch

Annual 30-200 cm high. Leaflets 4-12 pairs, linear to elliptical; stipules entire. Calyx strongly gibbous at the base; calyx-teeth unequal; corolla 10-20 mm long, violet, purple or blue, sometimes with white or yellow wings; limb of the standard c. $1/2$ as long as claw. Legume 20-40 x (4-) 6-12 mm, brown, stipitate. Seeds 2-8; hilum $1/12$ - $1/5$ of the circumference. Fl. 2-5.

Two subspecies occur: Subsp. *varia* (Host) Corb. (*V. dasycarpa* auct., Jan Ten.) has the leaflets (8-) 10-30 x 2-8 mm; racemes 10- to 30-flowered; and wings violet, purple, blue or white; subsp. *pseudocracca* (Bertol.) P.W. Ball has the leaflets 5-20 x 1-5 mm; racemes 3- to 10-flowered; and wings usually yellow.

Malta: rare at Attard (Borg); Wied Ghomor and Marsa (Delicata, Gullia).

C. and S. Europe; W. Asia; N. Africa.

3. *V. monantha* Retz. subsp. *triflora* (Ten.) B.L. Burtl. & P. Lewis.

Mediterranean Vetch

Subglabrous annual 30-60 cm high. Leaflets 5-8 pairs, 10-25 x 1-6 mm, linear-oblong; stipules bipartite, lobes entire. Calyx-teeth unequal, shorter than tube; corolla pale purple. Legume 20-50 x 6-12 mm, yellow, glabrous. Seeds 3-7; hilum $1/2$ of the circumference. Fl. 4-5.

Malta: rare among weeds in gardens at Attard (Borg).

Mediterranean region.

Sect. *Ervum* (L.) S.F. Gray. Leaflets usually numerous (more than 4 pairs); flowers few, in long-pedunculate racemes; calyx not gibbous at base; corolla usually less than 10 mm long; style glabrous or equally pubescent all round.

4. *V. ervilia* (L.) Willd.

Zosfa
Southern Vetch

Glabrous or pubescent annual 30-50 cm high. Leaflets 5-10 pairs, 5-15 x 1-5 mm, oblong or linear; stipules dentate. Racemes 2- to 12-flowered. Calyx-teeth equal, longer than the tube; corolla 6-10 mm long, pale purple, white at base. Legume 15-30 x 5-10 mm, pale brown, pubescent or subglabrous, beaked. Seeds 3-6. Fl. 3-5.

Cultivated as a forage plant and often naturalised. Malta and Gozo: frequent (S. & C.G.; Borg).

Mediterranean region; W. Asia.

5. *V. leucantha* Biv.

Brown-fruited Vetch

Glabrous or pubescent annual 30-50 cm high. Leaflets 5-10 pairs, 5-15 x 1-5 mm, oblong or linear; stipules dentate. Racemes 2- to 12-flowered. Calyx-teeth equal, longer than the tube; corolla 6-10 mm long, pale purple, white at base. Legume 15-30 x 5-10 mm, pale brown, pubescent or subglabrous, beaked. Seeds 3-6. Fl. 3-4.

In valleys and sheltered places. Malta: frequent as at Ta' Baldu, Miahleb (S. & C.G.; Borg); Wied Ballut, Wied Babu, Maqluba, Wied Zembaq, Wied l-Ghasfurija.

Buskett, Ghajn il-Kbira, (GD; Borg); Girgenti, Wied Inċita (Borg); Wied Zem-baq, Ghasfurija (Gulia). Gozo: Xlendi, Mgarr ix-Xini (Borg).

C. Mediterranean region.

6. *V. hirsuta* (L.) S.F. Gray

Hairy Tare

Pubescent annual 20-70 cm high. Leaflets 4-10 pairs, 5-20 x 1-3 (-5) mm, linear- or ovate-oblong; stipules entire, the lower linear-lanceolate, often with 2-4 setaceous teeth. Racemes 1- to 8-flowered, almost equalling leaves. Calyx-teeth equal, longer than tube. Corolla 2-4 (-5) mm long, dirty white with purplish tinge. Legume 6-11 x 3-5 mm, black, usually pubescent. Seeds usually 2; hilum $\frac{1}{3}$ of the circumference. $2n = 14$. Fl. 2-5.

Malta: rare at Wied Inċita (Borg).

Europe to c. 70° N; W. Asia; N. Africa. A weed of cultivation throughout much of the world.

7. *V. tenuissina* (Bieb.) Schinz & Thell.
V. tetrasperma var. *gracilis* (Lois.) Borg

Slender Tare

Subglabrous annual 15-60 cm high. Leaflets 2-5 pairs, (6-) 10-25 x 1-3 mm, linear; stipules entire. Racemes (1-) 2- to 5-flowered, longer than leaves. Calyx-teeth unequal, shorter than tube; corolla (5-) 6-8 mm long, pale purple. Legume 12-17 x 3-4 mm, brown, glabrous or pubescent. Seeds 4-6; hilum $\frac{1}{3}$ - $1/12$ of the circumference. Fl. 3-5.

Grassy places. Malta: occasional (G. Lanfranco), as at Gnejna, Girgenti, Wied Qirra, Mtaħleb, (S. & C.G.); Buskett, Wied Inċita, Addolorata Cemetery (Borg); Mistrà (Kramer & Westra).

S. & W. Europe.

8. *V. tetrasperma* (L.) Schreber

Plate XIX

Smooth Tare

Subglabrous annual 10-60 cm high. Leaflets 3-6 (-8) pairs, 5-20 x 0.5-3 mm, linear or linear-oblong; stipules entire. Racemes 1- or 2-flowered, about equalling leaves. Calyx-teeth unequal, shorter than tube; corolla 4-8 mm long, pale purple. Legume 9-16 x 3-5 mm, brown, usually glabrous. Seeds 3-5; hilum $1/5$ of the circumference. Fl. 2-5.

Uncultivated land and moist valleys. Malta: frequent (G. Lanfranco; Wolseley), as at Buskett, Verdala Park, Wied Inċita, Wied Għerħuma, Wied il-Għasel (Borg); Gozo: Wied il-Lunzjata, Xlendi, Mgarr ix-Xini (Borg).

Throughout Europe to 62° N. in Fennoscandia and Russia; W. Asia; N. Africa.

9. *V. pannonica* Crantz subsp. *striata* (Bieb.) Nyman

Yellow-fruited Vetch

Pubescent annual 10-60 cm high. Leaflets 4-10 pairs, 8-30 x 2-7 mm, oblong or linear-oblong, obtuse or truncate, mucronate; stipules entire, spotted. Flowers (1-) 2-4 together; calyx-teeth subequal, shorter than tube; corolla 14-20 mm long, purple or yellow, standard pubescent on back. Legume 20-35 x 7-11 mm, yellow pubescent. Seeds 2-8; hilum $\frac{1}{3}$ - $\frac{1}{4}$ of the circumference. $2n = 12$. Fl. 4-5.

Malta: in fields around the St. Vincent de Paul Hospital (Borg).

C. & E. Europe extending to E. France; N. & E. Spain.

10. *V. sativa* L.

Gilbiena sewda
Common Vetch

Pubescent annual up to 80 cm high. Leaflets 3-8 pairs, 6-20 (-30) x 1-6 mm, linear to obovate, acute to retuse, mucronate, stipules dentate, usually with a dark spot. Flowers 1-2 (-4) together; calyx-teeth equal, longer or shorter than tube; corolla (8-) 10-30 mm long, purple. Legume 25-70 x (3-) 4-10 mm, usually black, glabrous or pubescent, breaking the calyx when mature. Seeds 6-12; hilum $1/5$ - $\frac{1}{4}$ of the circumference. Fl. 2-5.

Very variable. The Malta plants appear to belong to 3 subspecies. Subsp. *sativa* has the leaflets oblong-cuneate to obovate, truncate or emarginate; calyx-teeth as long as or longer than the tube; corolla 18-30 mm long; standard pink to dark reddish-purple, the wings darker; legume 35-70 x 6-11 mm, contracted between the seeds, brown or yellow-brown; usually hairy; and seeds 3.5-6.5 mm, $2n = 12$. The cultivated form, subsp. *nigra* (L.) Ehrh. (var. *cuneata* (Guss.) Fiori; var. *heterophylla* (C. Presl) Fiori) has the leaflets linear to oblong-cuneate, acute, obtuse or truncate; calyx-teeth shorter than tube; corolla (8-) 10-18 mm long; standard light reddish-purple, the wings similar or somewhat darker; legume 25-55 x (2.5-) 3-6 mm, not contracted between the seeds, black or blackish-brown, usually glabrous; and seeds 2-4 mm, $2n = 12$, 14. Common on arid rock localities (Borg). Subsp. *amphicarpa* (Dorthe) Ascherson & Graebner (var. *amphicarpa* (Dorthe) is a plant with underground stems bearing minute apetalous flowers and white, irregularly ovate 1- or 2-seeded legumes c. 15 mm long; leaflets linear, acute to obcordate; calyx-teeth shorter than tube; corolla 20-25 mm long; standard dark reddish-purple, the wings much darker; legume 25-35 x 4-6 mm, not contracted between the seeds, dark brown, usually glabrous and seeds 4.5-5 mm. Malta: Buskett (Duthie; Borg).

Widely cultivated as well as native. Malta and Gozo; very common (S. & C.G.; Borg; G. Lanfranco; Wolseley). Comino: (Borg).

Throughout Europe to 69° N. in Russia; W. Asia; N. Africa.

11. *V. peregrina* L.

Slender-leaved Vetch

Sparsely pubescent annual up to 100 cm high. Leaflets 3-7 pairs, 8-10 x 0.5-2 (-3) mm, linear, mucronate and retuse with acute lobes, so that the apex appears to be 3-lobed; stipules entire. Flowers solitary or 2 together. Calyx-teeth unequal, the lowest equalling tube; corolla 10-16 mm long, purple. Legume 30-40 x 8-12 mm, brown, pubescent. Seeds 4-6; hilum $1/10$ - $1/12$ of the circumference. Fl. 2-4.

Shaded valleys. Malta: rare, Addolorata valley, Buskett (S. & C.G.; Borg); Wied Inċita (Borg).

Mediterranean region; W. Asia.

12. *V. hirta* L.

Yellow Vetch

incl. var. *hirta* Balbis ex Pers.

Subglabrous to villous annual up to 60 cm high. Leaflets 3-10 pairs, 10-25 x 1-5 mm, linear to oblong; stipules entire or dentate. Flowers 1-3 together. Calyx-teeth unequal, the lower longer than tube; corolla (15-) 20-35 mm long,

yellow, often purple-tinged. Legume 20-40 x 8-14 mm, yellowish-brown to black, pubescent, the hairs tuberculate at base, rarely glabrous. Seeds 3-9; hilum $\frac{1}{2}$ of the circumference. $2n = 14$, Fl. 3-4.

Malta: Addolorata Cemetery (C.G.; Borg); Ghaju Tuffieha, Manikata (Fenza).

S. Europe, extending northwards to c. 52°N in W., C. & E. Europe; W. Asia.

13. *V. bithynica* (L.) L.

Gilbiana Roxna

Glabrous or pubescent annual 20-60 cm high. Leaflets 2-3 pairs, 20-50 x 2-20 mm, oblong-lanceolate to ovate; stipules dentate. Flowers 1-3 together, calyx-teeth unequal, longer than tube; corolla 16-20 mm long, standard purple, wings and keel white. Legume 25-40 x 7-10 mm, brown or yellow, pubescent. Seeds 4-7; hilum $\frac{1}{6} - \frac{1}{7}$ of the circumference. $2n = 14$, Fl. 3-4.

Cultivated places. Malta: very rare; Ghaju il-Kbira (S. & C.G.); Għirgenti, San Anton gardens, Attard (Borg).

S. & W. Europe; Asia Minor; Algeria.

14. *V. narbonensis* L.

Gilbiana Roxna

incl. var. *serratifolia* (Jacq.) Fiori

Narbonne Vetch

Pubescent, erect annual 20-60 cm high. Lower leaves without tendrils; leaflets 1-3 pairs, 20-50 x 10-40 mm, ovate or elliptical, obtuse or emarginate, entire or serrate; stipules c. 10 mm long, entire or dentate. Flowers 1-6 together. Calyx-teeth unequal, the lower longer than tube; corolla 10-30 mm long, dark purple. Legume 30-70 x 10-15 mm, black or brown, glabrous with tuberculate-dentate, pubescent margin. Seeds 4-8, 4-6 mm; hilum $\frac{1}{2}$ of the circumference. Fl. 3-4.

Malta: widely cultivated, rare as a native at Luqa (Armitage; S. & C.G.; Borg); Tarxien, Għirgenti, Marsa (Borg).

C. & S. Europe; N. Africa; W. Asia.

15. *V. faba* L.

Faba

Broad Bean

Differs from *V. narbonensis* as follows: plant more robust; leaves without tendrils; leaflets 40-80 (-100) x 10-20 (-40) mm; corolla usually white with black wings; legume 80-200 x 10-20 mm, densely pubescent but becoming sparsely pubescent when mature; seeds 20-30 mm in diameter, ovoid-oblong, compressed. Fl. 2-5.

Malta, Gozo and Comino: extensively cultivated for the edible seeds and immature legume and as fodder (Borg; Wolsley); often naturalised near farm stands (Wolsley).

Cultivated in the Mediterranean region since prehistoric times.

12. *Lens* Miller

Like *Vicia* but calyx-teeth equal and at least twice as long as the tube; style pubescent on the upper side; legume strongly compressed; seeds flat, orbicular.

1. *L. culinaris* Medicus

Vicia lens (L.) Cosson & Germ.

Lentil

(Lentil)

Annual, stems up to 40 (-50) cm high, patent-pubescent. Leaves sometimes without tendrils; leaflets 3-8 pairs, up to 20 x 8 mm, oblong or elliptical; stipules oblong-lanceolate, entire; racemes about equalling leaves; calyx-teeth up to 6 times as long as tube; corolla 4-7 mm long, pale blue or lilac. Legume 12-16 x 6-12 mm. Fl. 3-5.

Malta and Gozo: cultivated as a catch crop or along with wheat (Borg).

Origin not known; widely cultivated in temperate and subtropical regions.

13. *Lathyrus* L.

Annual or perennial herbs, often climbing by means of tendrils. Leaves usually paripinnate and terminated by a tendril, rarely reduced to a tendril or a grass-like phyllode; leaflets usually distinctly parallel-veined; stipules usually herbaceous. Flowers in axillary racemes or solitary, axillary. Calyx acinaciform to bilabiate; keel usually obtuse; stamens diadelphous; style pubescent on the upper side, rarely glabrous. Legume usually oblong, compressed, dehiscent. Seeds 2 or more.

- | | | |
|--|-----------------------|----|
| 1. Leaves without leaflets | 11. <i>aphaca</i> | |
| At least the upper leaves with 1 or more pairs of leaflets | | 2. |
| 2. Stem winged, at least in the upper part | | 3. |
| Stem not winged | | 3. |
| 3. Lower leaves without leaflets, the rachis broadly winged and resembling a leaf | | 4. |
| All leaves with 1 or more pairs of leaflets | | 6. |
| 4. Upper leaves with 1-2 pairs of leaflets; corolla yellow; dorsal suture of legume with 2 wings | 10. <i>ochrus</i> | |
| Upper leaves with 2-4 pairs of leaflets; corolla purple lilac, white or pink wings; legume with no wings | | 5. |
| 5. Wings violet or lilac; standard emarginate; dorsal suture of legume channelled | 8. <i>clymenum</i> | |
| Wings white or pink; standard mucronate; dorsal suture of legume channelled | 9. <i>articulatus</i> | |
| 6. Racemes 1-3 flowered | 6. <i>annuus</i> | 7. |
| Flowers solitary | | |
| 7. Corolla yellow, often tinged with red | 7. <i>gorgoni</i> | 2. |
| Corolla variously coloured, but never yellow | | |
| 8. Corolla white, pink or blue | 5. <i>salvus</i> | 9. |
| Corolla red | | |
| 9. Calyx-teeth as long or slightly longer than the tube; legume with no keels on dorsal suture | 3. <i>setifolius</i> | |
| Calyx-teeth 2-3 times as long as the tube; legume with 2 keels on dorsal suture | 4. <i>diversa</i> | |

10. Calyx pale purple; peduncles 2-5 mm long; seeds smooth with hilum less than 1/20 of the circumference

Calyx red when fresh; peduncle 5-70 mm; seeds with hilum more than 1/20 of the circumference

11. Legume 3-7 mm wide, glabrous; seeds 3-15, smooth or slightly rugose; peduncles usually aristate

Legume 7-11 mm wide, pubescent when immature; seeds 2-3, coarsely reticulate-rugose; peduncles not aristate

1. *L. sphaericus* Retz.

Plate XIX

Round Pea

Glabrous or pubescent annual; stem 10-50 cm high, not winged. Leaflets 1 pair, 20-60 (-100) x 1-7 mm, linear to linear-lanceolate; stipules 6-15 x 0.5-1 mm, linear, semi-sagittate. Flowers solitary; peduncles 5-20 mm long, aristate, articulated near the middle or apex. Calyx teeth equal, as long as or slightly longer than the tube; corolla 6-13 (-16) mm long, orange-red. Legume 30-70 x 4-7 mm, brown, glabrous, with prominent longitudinal veins. Seeds 8-15, smooth or slightly rugose; hilum $\frac{1}{4}$ - $\frac{1}{11}$ of the circumference. $2n = 14$. Fl. 3-5.

Among undisturbed vegetation on rocky ground. Malta: uncommon (G. Lanfranco), as at Mgiret, Marsa, Gnejna (S. & C.G.; Borg); Buskett (S. & C.G.; Borg; Wolseley); Addolorata Cemetery, Verdala Park (Borg); Dingli, San Pawl tat-Targa (Wolseley).

C. and S. Europe; W. Asia; N. & W. Africa; naturalised elsewhere.

2. *L. inconspicuus* L.

Solitary-flowered Pea

Incl. var. *erectus* Lag.

Glabrous annual; stem 10-30 cm high, not winged. Leaves without or with a usually simple tendril; leaflets 1 pair, 25-40 x 1-4 mm, linear-lanceolate; stipules 7-10 x 0.5-2 mm, linear or lanceolate, semi-sagittate. Flowers solitary; peduncles 2-5 mm long, articulated near the base or middle. Calyx teeth equal, as long as tube; corolla 4-9 mm long, pale purple. Legume 30-60 x 2-5 mm, pale brown, densely pubescent when young, glabrescent. Seeds 5-14, smooth; hilum $\frac{1}{25}$ - $\frac{1}{20}$ of the circumference. Fl. 2-4.

Malta: very rare; Verdala Park, Addolorata Cemetery (Borg).

Mediterranean region; W. Asia.

3. *L. setifolius* L.

Red Pea

Glabrous annual; stem 10-60 cm high, narrowly winged. Leaflets 20-30 x 0.5-3 (4) mm, linear; stipules 2-15 x 0.2-2 mm, linear, semi-sagittate. Flowers solitary; peduncles 10-40 mm long, articulated near the apex. Calyx-teeth slightly unequal, as long as or slightly longer than the tube; corolla 8-11 (-18) mm long, orange-red. Legume 15-30 x 7-11 mm, pale brown, glabrescent, but persistently pubescent on suture. Seeds 2-3, finely papillose; hilum $\frac{1}{9}$ - $\frac{1}{4}$ of the circumference. Fl. 4.

Malta: very rare in quarries at Luqa (Armitage, S. & C.G.; Borg).

S. Europe; Krim; Algeria.

4. *L. cicera* L.

Gibbiana tas-sorp
Fodder Pea

Glabrous annual; stem 20-100 cm high, winged. Leaflets 1(-2) pairs, 10-90 (-110) x 1-6 (-15) mm, linear to lanceolate; stipules 10-20 x 2-5 mm, lanceolate, semi-sagittate. Flowers solitary; peduncles 10-30 mm long, articulated near the middle or apex. Calyx teeth equal, 2-3 times as long as tube; corolla (5-) 10-14 (-20) mm long, reddish-purple. Legume 20-40 x 5-10 mm, brown, glabrous, with 2 keels on dorsal suture. Seeds 2-6, smooth; hilum $\frac{1}{13}$ of the circumference. $2n = 14$. Fl. 3-4.

Among growing crops and on rocky ground. Malta and Gozo: frequent, locally common (S. & C.G.; Borg; G. Lanfranco; Wolseley). Mediterranean region; W. Asia; N. W. Africa.

5. *L. sativa* L.

Cicarda
White Pea

Differs from *L. cicera* as follows: leaflets 25-150 x 3-7 (-9) mm; peduncles 30-60 mm long; corolla 12-24 mm long, white, pink or blue; legume 10-18 mm wide with 2 wings on dorsal suture; hilum $\frac{1}{16}$ x $\frac{1}{15}$ of the circumference of the seed. $2n = 14$. Fl. 3-4.

Gozo: Cultivated as a forage crop and often found naturalised as at Ta' Harrax, Wied Bingemma (Borg).

Cultivated for fodder in C., S. and E. Europe; widely naturalised. Origin not known.

6. *L. annuus* L.

Annual Pea

Glabrous annual; stem 40-150 cm high, winged. Leaflets 1 pair, 50-150 x (1-) 4-18 mm, linear or linear-lanceolate; stipules 10-25 x 0.3-0.8 mm, linear, semi-sagittate. Racemes 1- to 3-flowered. Calyx teeth equal, as long as or slightly longer than the tube; corolla 12-18 mm long, yellow or orange-yellow. Legume 30-80 x 7-12 mm, pale brown, glandular when young, glabrescent. Seeds 7-8, tuberculate or papillose; hilum $\frac{1}{10}$ - $\frac{1}{9}$ of the circumference. Fl. 4-5.

Malta: rare; Attard, Ghajn il-Kbira (S. & C.G.; Penza; Borg).

Mediterranean Europe; W. Asia; N. Africa; Macaronesia.

7. *L. gorgoni* Parl.

L. cicera var. *gorgoni* Parl.

Rare Pea

Glabrous annual; stem 20-60 cm high, winged. Leaflets 1 pair, 30-60 x 3-9 mm, linear to linear-elliptic; stipules 25-45 x 3-5 mm, lanceolate, semi-sagittate. Flowers solitary; peduncles 30-45 mm long, articulated near apex. Calyx teeth equal, 2-3 times as long as the tube; corolla 18-25 mm long, reddish-yellow. Legume 25-50 x 7-10 mm, brown, glabrous, with 3 keels on dorsal suture. Seeds 2-3, smooth; hilum $\frac{1}{11}$ - $\frac{1}{9}$ of the circumference. Fl. 2-4.

Malta: rare near Addolorata Cemetery and Buskott (S. & C.G.; Borg). Gozo: rare at Wied Bingemma near Nadur (Borg).

Sardinia, Sicilia, Turkey-in-Europe, S.W. Asia.

8. *L. clymenum* L.

L. articulatus var. *clymenum* (L.) Fiori

Crimson Pea

Glabrous annual; stem 30-100 cm high, winged. Leaves with broad leaf-like petiole and rhachis, the lower linear-lanceolate, without leaflets, the upper with 2-4 (-5) pairs of leaflets, leaflets 20-60 (-80) x (3-) 6-11 (20) mm, linear to elliptical or lanceolate; stipules 9-18 x 2-6 mm, linear to ovate, semi-hastate. Racemes 1- to 5-flowered. Calyx-teeth equal, shorter than tube; corolla 15-20 mm long, crimson with violet or lilac wings, very rarely pale yellow; style aristate. Legume 30-70 x 5-12 mm, brown, glabrous, channelled on the dorsal suture, not torulose. Seeds 5-7, smooth; hilum 1/7 - 1/4 of the circumference.

Malta: Buskett, Wied Inġita, Wardija, Pwales, etc. (Borg). Gozo and Comino: (Borg).

Mediterranean region.

9. *L. articulatus* L.

Gilbiena tas-Serp
Southern Pea

Like *L. clymenum* but leaflets 0.5-5 (-11) mm wide; corolla with white or pink wings; style obtuse; legume 5-8 mm wide, not channelled on the dorsal suture, not torulose. Fl. 3-5.

Among growing crops and in rocky places. Malta, Gozo and Comino: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region.

10. *L. ochrus* (L.) DC.

Gilbiena bajda
Pale Pea

Like *L. clymenum* but the lower leaves ovate-oblong; upper leaves with 1-2 pairs of leaflets; leaflets 15-35 x 6-20 mm, ovate; stipules 6-12 mm long; racemes 1- to 2-flowered; calyx-teeth slightly unequal, as long as tube; corolla pale yellow; legume 40-60 x 10-12 mm, with 2 wings on the dorsal suture. $2n = 14$. Fl. 3-5.

Cultivated for its foliage and seeds; native in valleys and other rocky places. Malta, Gozo and Comino; Frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region.

11. *L. aphaca* L.

Porvina
Yellow Vetchling

Glabrous annual; stem up to 100 cm high, angled. Seedling leaves with 1 pair of small leaflets; mature leaves without leaflets but with a tendril; stipules 6-50 x 5-40 mm, ovate, hastate. Flowers usually solitary; peduncles 20-50 mm long. Calyx-teeth equal, 2-3 times as long as the tube; corolla 6-18 mm long, yellow. Legume 20-35 x 3-8 mm, brown, glabrous. Seeds 6-8; hilum 1/10 of the circumference. $2n = 14$. Fl. 3-5.

In cultivated and native vegetation. Malta and Gozo: common except in built up areas (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Europe but only as an alien in the north; N. Africa; W. Asia.

14. *Pisum* L.

Like *Lathyrus* but stems terete; calyx-teeth large and more or less leaf-like; wings adnate to keel; style dilated at apex, longitudinally grooved with recurved margins.

1. *P. sativum* L.

Plate XIX

Pizzelli
Pea

Glabrous annual up to 200 cm high. Leaflets 1-3 pairs, 2-7 x 1-4 mm, suborbicular to elliptical or oblong; stipules up to 10 x 6 cm, ovate to elliptical, semi-cordate at base. Racemes 1- to 3-flowered. Flowers 15-35 mm long, white to purple. Legume 30-120 x 10-25 mm, yellow or brownish, reticulate-veined. Seeds up to 10. Fl. 3-5.

Two subspecies occur: subsp. *sativum* (incl. *P. arvense* L.) has the racemes shorter than or only slightly exceeding the leaves; flowers white or purple; seeds globose or somewhat angular, smooth or rugose. Malta: Ta' Baldu, Rabat, Bahrija (Borg); Dingli (Borg; Wolseley) and elsewhere. Gozo: Sannat, Ghajnsielem (Borg); Perga and elsewhere (Wolseley). Subsp. *elatius* (Bieb.) Ascherson & Graebner: has the racemes exceeding the leaves; corolla lilac or purple; seeds globose, granular.

Malta: Buskett, Dingli, Siggiewi, Attard, Hemsija and elsewhere (Borg).

S. Europe; cultivated elsewhere since prehistoric times for the edible seed and for fodder, and often occurring as an escape from cultivation.

15. *Ononis* L.

Annual or perennial herbs, or dwarf shrubs, usually glandular-hairy. Leaves 3-foliate, sometimes simple or imparipinnate, leaflets usually toothed; stipules adnate to petiole. Flowers in panicles, spikes or racemes. Calyx campanulate or tubular; corolla yellow, pink or purple, sometimes nearly white; keel more or less beaked; stamens monadelphous. Legume oblong or ovate, dehiscent. Seeds 1-many.

- | | | |
|---|----------------------------|----|
| 1. Perennial; stems woody at least at base | 1. <i>natrix</i> | 2. |
| Annual; stems herbaceous | | |
| 2. Legume torulose | 2. <i>ornithopodioides</i> | 3. |
| Legume not torulose | | |
| 3. Corolla 12-16 mm long, twice as long as calyx | | 4. |
| Corolla 5-14 mm long, equal to calyx or slightly longer | | 5. |
| 4. Legumes c. 20 mm long; leaves 3-foliate | 3. <i>biflora</i> | |
| Legumes c. 8 mm long; leaves 1-foliate | 7. <i>variegata</i> | |
| 5. Calyx campanulate | | 6. |
| Calyx tubular | | 7. |
| 5. Calyx without prominent white veins; flowers with pedicels up to 5 cm long | 6. <i>olneyana</i> | |
| Calyx with prominent white veins; flowers subsessile | 8. <i>mississina</i> | |
| 7. Corolla yellow, standard with pink or red veins | 5. <i>viscosa</i> | |
| Corolla pink or white, with or without purplish standard | | 8. |

8. Legume 8-14 cm long, linear or oblong; pedicels strongly deflexed after flowering.
Legume 5-6 mm long, ovate, flowers subsessile

4. *reclinata*
8. *marissima*

Sect. *Natrix* Griseb. Flowers in panicles, the primary branches 1- to 3- flowered; fruiting pedicels usually more or less deflexed. Legume oblong.

1. *O. natrix* L.

Plate XX

Brozka
Bush Restharrow

Erect, much-branched dwarf shrub; stems 20-60 cm high, densely glandular-hairy. Leaves 3-foliate, the lower rarely pinnate; leaflets variable, ovate to linear. Flowers in lax leafy panicles, the primary branches 1-flowered. Corolla 6-20 mm long, yellow, frequently with red or violet veins. Legume 10-25 mm long. Seeds 4-10, c. 2 mm in diameter, smooth or minutely tuberculate. Fl. 4-5.

Two subspecies occur: subsp. *natrix* has the stem with dense, long (0.5-2 mm) glandular and eglandular hairs; and calyx teeth 2.5-4 times as long as the tube. Subsp. *ramosissima* (Desf.) Batt. has the stem with short (0.2-0.5 mm) glandular hairs (sometimes with some longer hairs); and calyx teeth 1.5-2.5 times as long as the tube.

Rocky coastal areas, Malta: locally frequent as at Marfa, and Mellieha (S. & C.G.; Borg; Wolseley); Selmun (Kramer & Westra); Qalet Marku (Gauci). Gozo and Comino: abundant in many places as at Chambray, Nadur, Ta' Cenč, Dabrari, Ta' Harrax (S. & C.G.; Borg; Wolseley)

Mediterranean region and W. Europe.

2. *O. ornithopodioides* L.

Bird Restharrow

Erect annual up to 30 cm high; stems glandular-hairy. Leaves 3-foliate; leaflets 10-15 mm long; obovate to oblanceolate, the terminal long-petiolate. Primary branches of the inflorescence 1- or 2-flowered, aristate, as long as the leaflets. Corolla 6-8 mm long, yellow, shorter than the calyx. Legume 12-20 mm long, sub-falcate, torulose. Seeds 6-10, c. 1.5 mm in diameter, acutely tuberculate. Fl. 3-5.

Rocky, arid places: Malta: infrequent (G. Lanfranco) as at Wied il-Għasel (S. & C.G.; Borg); Hark il-Hamien (Donaldson, S. & C.G.; Borg); Madliena (Reade; Borg); Buskett (Borg; S. & C.G.); Verdala. Ta' Lawrenti, Wardija (Borg); Kalkara ravine (Kramer & Westra). Gozo: Ras il-Qala and Marsalforn (Duthie; Borg); Xlendi (Gaulthier; Borg). Comino: not rare (S. & C.G.).

Mediterranean region.

3. *O. biflora* Deaf.

Two-flowered Restharrow

Erect annual 10-50 cm high; stems sparsely glandular-hairy. Leaves 3-foliate; leaflets 15-20 mm long, elliptical, fleshy. Primary branches of the inflorescence 15-40 mm long, usually lanceolate or oblong. Flowers borne singly at each node, in lax terminal racemes; pedicels c. 5 mm long, up to 15 mm long after anthesis. Corolla 10-13 mm long, pink or whitish, exceeding the calyx. Legume 5 mm long. Seeds c. 4, c. 1.5 mm in diameter, minutely tuberculate. Fl. 3-5.

Fields and grassy places. Malta: rather rare. Kordin, Għgantija (S. & C.G.; Borg; Wied il-Kalkara (GD; S. & C.G.; Borg); convent of St. Liberata, Gnejna, Marsaxlokk (S. & C.G.; Borg).

Kala, Ramla ta' Marokk (Gulia; Borg). Gozo: between Xewkija and Mgarr ix-Xini (S. & C.G.; Borg).

Mediterranean region.

4. *O. reclinata* L.

Small Restharrow

Procumbent annual 2-15 cm high; stem villous and glandular-hairy. Leaves 3-foliate; leaflets 5-8 mm long, oblanceolate to obovate-orbicular. Primary branches of inflorescence up to 10 mm long, mucous, 1-flowered. Corolla 5-10 mm long, pink or purple, about equalling the calyx. Legume 8-14 mm long. Seeds up to 20, 0.5-1 mm in diameter, acutely tuberculate. Fl. 4-5.

Rocky uncultivated waste land and fields. Malta, Gozo and Comino: frequent (Borg; Lanfranco; Kramer & Westra; Wolseley). Cominotto: (Borg).

Mediterranean region, northwards to S. England.

5. *O. viscosa* L.

Sticky Restharrow

Erect annual 10-80 cm high; stems densely and softly hairy and glandular. Leaves 1- to 3-foliate; primary branches of the inflorescence shorter than leaves, long, variable, unequally elliptical to obovate, obtuse. Primary branches of the inflorescence 10-20 mm long, aristate, 1-flowered. Corolla up to 12 mm long, yellow, the standard frequently with red veins. Legume up to 20 mm long, not or only slightly inflated. Seeds many, 1-1.5 mm in diameter, yellow-brown, acutely tuberculate. $2n = 32$. Fl. 3-6.

Two subspecies occur. Subsp. *sieberi* (Besser ex DC). Sirj. is frequent and has the leaves 1- to 3-foliate; primary branches of the inflorescence shorter than leaves, often nearly mucous; flowers aggregated at apices of branches; corolla exceeding calyx, standard often pink; legume rather longer than calyx. Ssp. *viscosa* is recorded from Gozo above Wied Hanžira (I. Evans; Gauci) and has the leaves 1-3-foliate; primary branches of inflorescence longer than leaves, arista 6-15 mm long; corolla exceeding the calyx, yellow; legume exceeding calyx; seeds numerous.

Fallow fields and uncultivated ground. Malta, Gozo and Comino: very frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region.

Sect. *Ononis* (Sect. *Bugrana* Griseb.). Flowers in racemes or very condensed panicles with the primary branches not more than 1.5 mm long; legume usually erect or patent, ovate or rhombic; seeds few.

6. *O. oligophylla* Ten.

Few-leaved Restharrow

O. alba var. *oligophylla* (Ten.) Flori

Annual, stems 15-45 cm high; stems ascending or procumbent, branching from the base, villous and with scattered glandular hairs. Leaves 1-foliate; leaflets 10-45 mm long, usually lanceolate or oblong. Flowers borne singly at each node, in lax terminal racemes; pedicels c. 5 mm long, up to 15 mm long after anthesis. Corolla 10-13 mm long, pink or whitish, exceeding the calyx. Legume 5 mm long. Seeds c. 4, c. 1.5 mm in diameter, minutely tuberculate. Fl. 5-6.

Gozo: rather rare, towards Għgantija, between Rabat and Nadur, on the road between Rabat and Marsalforn (S. & C.G.; Borg).

Italy, Sicilia.

7. *O. variegata* L.

Villous Restharrow

Procumbent or ascending annual 10-30 cm high; stems glandular-tomentose and villous. Leaves 1-foliate; leaflets 5-10 mm long, obovate. Flowers borne singly at each node in a lax terminal, often branched raceme; pedicels up to 4 mm long. Corolla 12-14 mm long, yellow, much exceeding the calyx. Legume c. 3 mm long. Seeds 10-14, c. 1.5 mm in diameter, reddish-brown, smooth. Fl. 4-5.

Sandy maritime areas. *Malta*: rare, Marsaskala (Medlycott fide Gulia; Borg). Gozo: Ramla (S. & C.G.; Borg; Kramer & Westra).

Mediterranean region.

8. *O. mitissima* L.

Mediterranean Restharrow

Erect or procumbent annual; stems 15-60 cm high, somewhat tomentose or nearly glabrous. Leaves 3-foliate; leaflets 10-20 mm long, obovate or elliptical, sometimes caducous; lower bracts 3-foliate, upper without leaflets, concave and membranous. Flowers shortly pedicellate, borne singly at each node, in a dense terminal raceme. Calyx-tube glabrous, with very prominent white veins; margins of teeth glandular-ciliate. Corolla 10-12 mm long, pink, exceeding the calyx. Legume 5-6 mm long, ovate. Seeds 2-3, 1.5-2 mm in diameter, dark brown, spinulose. Fl. 4-7.

Sandy and clayey soils. *Malta*: rather rare (G. Lanfranco), as at Gnejna, St. Paul's Bay, Mellieha, Mistra, Buskett (S. & C.G.; Borg); Wied il-Kalkara (GD; Borg); Birzebbuga (Gulia; Borg); Mgiebaħ (Gauci). Gozo: Marsalforn, Xlendi (S. & C.G.). Comino: Qala Sta Maria (S. & C.G.; Borg; Wolseley).

Mediterranean region; Macaronesia.

16. *Melilotus* Miller

Annual, biennial or short lived perennial herbs. Leaves 3-foliate; leaflets usually toothed. Flowers in axillary racemes. Calyx-teeth subequal; corolla white or yellow, rarely tinged with blue or violet, deciduous, free from the staminal tube; stamens diadelphous, the filaments not dilated. Legume globose to obovoid, rarely lanceolate-rhomboid, straight, indehiscent or very tardily dehiscent. Seeds 1-2, rarely more.

- | | |
|--|-----------------------|
| 1. Stipules of the middle leaf entire or minutely denticulate | 2. |
| Stipules of the middle leaf toothed | 3. |
| 2. Corolla 2-3 mm long; legume 1.5-3 mm in diameter | 2. <i>indica</i> |
| Corolla 4-5 mm long; legume 3.5-4 mm in diameter | 3. <i>elegans</i> |
| 3. Legume reticulate-veined | 1. <i>italica</i> |
| Legume concentric-striate | 4. |
| 4. Racemes much shorter than subtending leaf; legume acute | 7. <i>messanensis</i> |
| Racemes in fruit at least as long as subtending leaf; legume rounded at apex | 5. |
| 5. Standard as long as or longer than keel; legume blackish-brown | 4. <i>infesta</i> |
| Standard shorter than keel; legume yellowish-brown | 6. |
| 6. Corolla 3-4 mm long; legume broadly sessile; leaflets oblong-cuneate | 5. <i>sulcata</i> |

Corolla 4-8 mm long; legume stipitate, leaflets obovate-cuneate

6. *segetalis*

Italian Melilot

1. *M. italica* (L.) Lam.

Erect, branched annual 20-60 cm high. Lower leaflets orbicular-ovate, the upper narrower, all obtuse or truncate, serrate above middle. Stipules incisely-dentate. Racemes 1.5-3 cm long, lax, many-flowered, elongating in fruit. Corolla 6-9 mm long, yellow; standard longer than wings and keel. Legume 5-6 mm in diameter, globose, obtuse with an apiculus, strongly reticulate-veined, yellowish or greyish-brown when ripe. Fl. 2-4.

Fields among crops. *Malta*: (GD; Gulia; Borg).

Mediterranean region.

2. *M. indica* (L.) All.

Trew
Small Melilot

Erect or ascending annual 15-50 cm high. Leaflets lanceolate-oblong, serrate. Stipules sub-entire. Racemes dense, (10-) many-flowered. Corolla 2-3 mm long, pale yellow; wings and keel equal, shorter than standard. Legume 1.5-3 mm in diameter, subglobose, strongly reticulate-veined, glabrous, whitish-grey when young. Fl. 3-5.

Cultivated places and field margins. *Malta*: frequent (G. Lanfranco), as at Mtabieb, Ta' Baldu, Marsa (S. & C.G.; Borg); Cospicua (Pouza); Mrieħel (Borg). Comino: (S. & C.G.; Borg).

Mediterranean region; W. Asia; introduced elsewhere.

3. *M. elegans* Salzm. ex Ser.

Elegant Melilot

Erect annual 20-150 cm high; stem pubescent above. Lower leaflets obovate, orbicular, the upper oblong, all obtuse or truncate, serrate. Lower stipules triangular-lanceolate, the upper linear-setaceous, entire. Racemes 1.5-2 cm long, lax, 15- to 30-flowered. Corolla 4-5 mm long, yellow; standard and wings equal, shorter than keel; ovary glabrous. Legume 3.5-4 mm in diameter, obovoid, compressed, with transverse or sigmoid veins, brownish yellow when ripe. Fl. 3-5.

Malta: rare (G. Lanfranco), as at Ġirgenti, Ġħajn il-Kbira, Siggiewi, Hemsija (Borg).

W. & C. Mediterranean region.

4. *M. infesta* Guss.

Trew
Round-fruited Melilot

Erect or ascending, branched annual 30-50 cm high. Lower leaflets triangular or cuneate-obovate, the upper oblong-cuneate. Stipules semi-ovate or sagittate, dentate. Racemes 2-3 cm long, lax, 15- to 50-flowered, elongating in fruit. Corolla 6-7.5 mm long, yellow, standard and keel subequal, shorter than wings; ovary glabrous. Legume 4-5 mm in diameter, subglobose or obovoid; concentric-striate, blackish-brown when ripe. Fl. 2-4.

Malta: frequent (Borg; Wolseley) as at Ġirgenti, Ta' Baldu, St. Paul's Bay, Mellieħa, Mtabieb, San Martin, Wardija, Baħrija, Hemsija. Gozo: Nadur, Ramla, Xlendi (Borg).

W. Mediterranean region.

5. *M. sulcata* Desf.

Trew
Mediterranean Melilot

Erect, branched or simple annual 10-40 cm high. Leaflets oblong, cuneate, obtuse, serrate. Stipules dentate. Racemes 1-1.5 cm long, 8- to 25-flowered, elongating in fruit and then as long as or longer than the leaves. Corolla 3-4 mm long, yellow. Legume 3-4 mm in diameter, globose, concentric-striate, pale yellow or yellowish-brown when ripe. Fl. 1-5.

Fields and dry grassy places. *Malta*, *Gozo* and *Comino*: very common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region.

6. *M. segetalis* (Brot.) Ser.

Trew
Corn Melilot

Erect annual 40-60 cm high. Leaflets obovate-cuneate, obtuse, serrate. Lowest stipules entire, the upper dentate. Racemes c. 3 cm long, dense, 30-50-flowered, c. 3 times as long as their subtending leaf. Corolla 4-8 mm long, yellow. Legume 2.5-5.5 mm in diameter, oblong-globose, concentric-striate, yellow when ripe. Fl. 2-5.

Fields, valleys and waste places. *Malta*, *Gozo*, *Comino* and *Filfa*: very common (S. & C.G.; Borg). *Cominotto*: (Duthie; Borg; G. Lanfranco).

Mediterranean region.

7. *M. messanensis* (L.) AF.

Plate XX

Trew
Southern Melilot

Erect or ascending, branched annual 20-40 cm high. Leaflets obovate-orbicular or lanceolate-cuneate, serrate. Lower stipules triangular-lanceolate, denticulate, the upper lanceolate, entire but denticulate at base. Racemes 0.7-1 cm long, 3- to 10-flowered, shorter than their subtending leaves. Corolla 4-5 mm long, yellow; standard and keel subequal, longer than wings. Legume 5-8 mm in diameter, oblique-ovoid, acute, concentric-striate, yellowish-brown when ripe. Fl. 2-5.

Fields, valleys and uncultivated ground. *Malta* and *Gozo*: common and often abundant where it occurs (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Comino*: (S. & C.G.; Borg).

Mediterranean region.

17. *Trigonella* L.

Annual. Leaves pinnately 3-foliate; leaflets usually toothed. Flowers solitary or in sessile or pedunculate axillary heads or short racemes. Calyx teeth equal or unequal; corolla yellow, blue or purplish, free from the staminal tube, deciduous; stamens diadelphous or monadelphous; filaments not dilated. Legume usually linear or oblong, straight or curved, indehiscent or dehiscing along one suture. Seeds 1-many.

1. Corolla blue
Corolla yellow
2. Racemes sessile
Racemes pedunculate

1. *foenum-graecum*
- 2.
3. *monspeliacea*

3. Calyx 2-2.5 mm long, teeth equal
Calyx 3-4 mm long, teeth unequal

1. *maritima*
2. *corniculata*

1. *T. maritima* Delile ex Poiret

Sea *Trigonella*

Stems 5-40 cm long, procumbent, glabrous. Leaflets 5-10 x 5-8 mm, ovate, truncate or emarginate, denticulate, glabrous or sparsely hairy beneath. Racemes subumbellate, (3-) 5- to 10-flowered; peduncles 1-2 cm long; pedicels 1-1.5 mm long. Calyx 2-2.5 mm long, the teeth half as long as tube; pedicels 1-1.5 mm long, yellow. Legume 10-16 x 2-3 mm, pendulous, linear, somewhat curved and deflexed, subglabrous or sparsely hairy, with thick, oblique veins. Seeds c. 1 mm in diameter, ovoid, brown, smooth. Fl. 2-4.

Exposed places near the sea. *Malta*: Bieb il-Għira (GD, S. & C.G.; Borg); Sliema (Gulia; Borg).

C. Mediterranean region; N. Africa; S.W. Asia.

2. *T. corniculata* (L.) L.

Horned *Trigonella*

Stems 10-55 cm long, procumbent to erect, glabrous or subglabrous. Leaflets 10-40 x 7-35 mm, linear-lanceolate to obovate, obtuse, sometimes emarginate. Racemes ovate-oblong, 8- to 15-flowered; peduncles up to 6 cm long; pedicels c. 3 mm long. Calyx 3-4 mm long, the teeth unequal, as long as or shorter than the tube; corolla 6-7 mm long, yellow; wings shorter than keel. Legume 10-16 x (1.5-) 2-3 mm, pendulous, linear, acuminate, compressed, somewhat curved, glabrous with thin transverse veins. Seeds 1-1.5 mm long, oblong, tuberculate. $2n = 16$. Fl. 3-5.

Malta: very rare. Wied Babu (GD; Borg); Marsaskala (Gulia; Borg).

Mediterranean region.

3. *T. monspeliaca* L.

Plate XX

Hairy *Trigonella*

Stems up to 35 cm high, densely appressed-pubescent. Leaflets 4-10 x 3-7 mm, obovate-cuneate, entire to incise-serrate. Racemes subumbellate, 4- to 14-flowered, subsessile; pedicels up to 1 mm long. Calyx c. 3 mm long, the teeth slightly longer than the tube; corolla c. 4 mm long, yellow. Legume 7-17 x 1-1.5 mm, pendulous, linear, slightly curved upwards, usually pubescent, with thick oblique veins. Seeds c. 1.5 mm, brown, finely tuberculate. Fl. 3-5.

Arid rocky places. *Malta*: infrequent (G. Lanfranco) as at Marfa, Kordin, St. Andrews, Ahrax (S. & C.G.; Borg); Mosta, San Pawl tat-Targa, Misrah Ghonoq, Buskett, Bugħba (Borg). *Gozo*: Rabat, in the citadel (S. & C.G.; Borg); Nadur, Xaghra (Borg; Wolseley). *Cominotto*: (Duthie).

C. & S. Europe; N. Africa; W. Asia.

1. *T. foenum-graecum* (Bieb.) Halacsy

Helba, Fionu
Cultivated *Trigonella*

Stems up to 40 cm high, densely hairy. Leaflets 8-20 x 7-12 mm, ovate-triangular or obovate, denticulate, villous. Racemes ovate, (3-) 10- to 15-flowered; peduncles 1-2 (-5) cm long (rarely shorter); pedicels c. 0.5 mm long. Calyx 5-8 mm long, villous, the teeth as long as the tube; corolla 11-13 (-16) mm long, blue. Legume (excluding beak) 10-15 x 2.5-3 mm, erect or patent, lanceolate, compressed, more or less straight, villous, with oblique anastomosing veins; beak 15-5 mm. Seeds c. 2.5 mm in diameter, ovate, finely tubercular. Fl. 4-5.

Sometimes cultivated or self-sown in fields and gardens. *Malta*: Gġgant, Siggiewi (Borg).

Probably native of S.W. Asia; cultivated and naturalised in Mediterranean region; E. Europe; N. Africa.

18. *Medicago* L.

Annual or perennial herbs or small shrubs. Leaves 3-foliate, stipulate. Flowers in axillary pedunculate racemes. Calyx campanulate, with 5 nearly equal teeth; corolla caducous, usually yellow; stamens diadelphous; filaments filiform. Legume longer than the calyx, nearly always indehiscent, usually spirally coiled, sometimes falcate, reniform or almost straight, often spiny. Seeds 1-several.

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| 1. Margin of legume with one longitudinal vein, with which the transverse veins join, sometimes running into spines, without a strong submarginal vein close to the marginal one | |
| Legume with a strong submarginal vein, or with a wide veinless border | |
| 2. Legume more or less falcate or reniform | 1. <i>lupulina</i> |
| Legume spirally coiled | |
| 3. Perennial with a stout woody stock | 2. <i>arborea</i> |
| Annuals | |
| 4. Margin of legume with distinct (usually long) spines | |
| Margin of legume without spines, occasionally with small rounded projections | |
| 5. Legume glabrous (except sometimes for the spines) and eglandular | 4. <i>intertexta</i> |
| Legume pubescent and glandular | 5. <i>clivaris</i> |
| 6. Legume strongly pelviform | 6. <i>scutellata</i> |
| Legume flat or convex at both ends | |
| 7. Transverse veins of legume not becoming thickened towards the thin margin | 3. <i>orbicularis</i> |
| Transverse veins of legume becoming thickened towards the thick marginal vein | 7. <i>rugosa</i> |
| 8. White-tomentose perennial; legume with a distinct hole through the centre | 9. <i>marina</i> |
| Annuals or nearly glabrous perennials; legume without a hole through the centre | |
| 9. Legume in a lax spiral, the young legume projecting from the calyx as soon as the petals have fallen | |
| Legume in a very close spiral, the young legume concealed within the calyx when the petals have fallen | |
| 10. Legume with a wide veinless border, $\frac{1}{4}$ - $\frac{1}{2}$ as wide as the radius of the spiral | 18. <i>tenoreana</i> |

Legume with prominent transverse veins and no wide veinless border 12.

- | | |
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| 1. Leaflets nearly always with a dark spot; marginal vein of legume sulcate, margin therefore with 3 conspicuous grooves | 16. <i>arabica</i> |
| Leaflets never with a dark spot; marginal vein of legume not sulcate | 13. |

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|--|------------------------|
| 12. Legume discoid to shortly cylindrical, usually glabrous or nearly so; transverse veins curved but not sigmoid, anastomosing freely | 17. <i>polycephala</i> |
| Legume subglobose, sparsely villous and often glandular; transverse veins sigmoid, not anastomosing | 19. <i>minima</i> |

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|---|-----|
| 13. Legume with a veinless border $\frac{1}{4}$ - $\frac{1}{2}$ as wide as the radius of the spiral | 15. |
| Legume without a wide veinless border. | 16. |

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| 14. Legume usually in a left-handed spiral; margin with 1 keel; spines usually short, obtuse | 14. <i>turbinata</i> |
| Legume always in a right-handed spiral; margin with 3 keels; usually long, acute | 15. <i>aurax</i> |

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| 15. Legume densely glandular-pubescent | 13. <i>aculeata</i> |
| Legume glabrous or with sparse hairs | 17. |

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|---|---------------------|
| 16. Legume discoid to cylindrical, transverse veins scarcely anastomosing | 11. <i>rigida</i> |
| Legume globose to ellipsoid; transverse veins anastomosing freely near the submarginal vein | 13. <i>aculeata</i> |

- | | |
|--|-----------------------|
| 17. Marginal and submarginal veins of legume confluent at maturity and forming a single acute or convex keel | 12. <i>littoralis</i> |
| Marginal and submarginal veins of legume separated by a distinct groove at maturity and so forming 3 keels | 18. |

- | | |
|--|-------------------|
| 18. Racemes usually with more than 3 flowers, legume glabrous, usually without spines; spines if present usually short, conical, straight or uncinat | 8. <i>tornata</i> |
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| 18. Racemes usually with 1-3 flowers; legume nearly always sparsely villous, always spiny; spines usually long, curved | 10. <i>truncatula</i> |
|--|-----------------------|

Subgen. *Medicago*. Legume without a submarginal vein parallel with and close to the marginal vein; margin of legume usually thin.

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|------------------------------|---------|-----------------------------|
| 11. 1. <i>M. lupulina</i> L. | Fig. 25 | Nefel iswed
Black Medick |
|------------------------------|---------|-----------------------------|

14. More or less pubescent annual or short-lived perennial 5-60 cm high. Leaflets orbicular, obovate to rhombic or oblong-cuneate, rounded to emarginate, usually apiculate; stipules lanceolate to ovate, serrate or entire. Racemes 10

to 50-flowered. Corolla 2-3 mm long. Legume 1.5-3 mm in diameter, reniform, black when ripe; transverse veins strongly curved, slightly anastomosing and forming an elongated network. Seed 1, black. $2n = 16$. Fl. 3-5.

Rocky ground everywhere. Malta and Gozo: common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Throughout Europe except the extreme north; N. Africa; W. Asia; Atlantic Islands.

2. *M. arborea* L.

Fig. 25

Shrub Medick

Scericeous shrub 100-400 cm high. Leaflets obovate, cuneate at base, entire or denticulate at apex, stipules lanceolate, entire. Racemes very short; almost capitate, 4- to 8-flowered. Corolla 12-15 mm long. Legume 12-15 mm in diameter, in a spiral with 1-1½ turns, not spiny, reticulately veined, with a hole through the centre.

Malta: Cultivated for ornament as at Argotti Gardens (Wolseley); naturalised Addolorata Cemetery, Buskett (Borg).

Mediterranean region.

3. *M. orbicularis* (L.) Bartal.

Fig. 25

Nefel

Round-fruited Medick

Glabrous or sparsely hairy, procumbent annual. Stems 20-90 cm long. Leaflets obovate-cuneate, dentate at the apex or in the upper ¼; stipules lacinate. Racemes 1- to 5-flowered. Corolla 2-5 mm long. Legume 10-17 (-20) mm in diameter in a spiral of 4-6 turns, not spiny, reticulately veined with a hole through the centre. Fl. 3-5.

Rocky ground and among crops. Malta, Gozo and Comino: common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

S. Europe; W. Asia; N. Africa; Atlantic Islands.

4. *M. intertexta* (L.) Miller

Fig. 25

Nefel

Prickly Medick

Nearly obovate, cuneate, denticulate, sometimes with a dark spot; stipules ovate to ovate-lanceolate, incise-dentate. Racemes 1- to 7 (-10) - flowered. Corolla 6-9 mm long. Legume 12-15 mm in diameter, in a spiral of (3-) 6-10 turns, ovoid, cylindrical or rarely discoid convex at both ends, glabrous except often for the spines; transverse veins strong, anastomosing and forming a tangentially elongated network; spines usually 3-4 mm long, curved and appressed to legume.

Fields and valleys. Malta: infrequent (G. Lanfranco) as at Wardija, San Martin Mtaheh, Gnejna, Ghajn Tuffieha, Wied Gerzuma, Ghajn Mula, Pwales, Mistrà (Borg); Wied il-Ghasri (Kramer & Westra). Gozo: Wied il-Lunzjata, Ramla Nadur (Borg).

Mediterranean region.

5. *M. ciliaris* (L.) All.

Fig. 25

Nefel

Ciliate Medick

Differs from *M. intertexta* as follows; legume villous, with glandular hairs; spines usually shorter, less appressed, straight except for the more or less curved apices. Fl. 3-5.

Rocky ground and fields. Malta and Gozo: common, often associated with *M. intertexta* (S. & C.G.; G. Lanfranco; Borg).

Mediterranean region; Atlantic Islands.

6. *M. scutellata* (L.) Miller

Fig. 25

Shield Medick

More or less densely glandular-pubescent annual 20-60 cm high. Leaflets obovate to elliptical, cuneate, dentate in the upper part; stipules ovate-lanceolate to lanceolate, incise-dentate. Racemes 1- to 3-flowered. Corolla 6-7 mm long. Legume 9-18 mm in diameter, in a spiral of 4-8 pelviform, imbricate turns, glandular-pubescent, not spiny; transverse veins numerous, conspicuous, freely anastomosing and joining the strong marginal vein. Fl. 3-5

Malta: Mellieha (Gulia; Borg). Comino: (Gulia; Borg).

S. Europe; W. Asia; N. Africa.

Subgen. *Cymatium* (Pospichal); Gams. Legume with a submarginal vein parallel with and close to the marginal vein; margin of legume usually thick.

7. *M. rugosa* Desr.

Fig. 25

Nefel

Rugose Medick

Glandular-pubescent annual 10-50 cm high. Leaflets obovate, cuneate, dentate in the upper part; stipules lanceolate, incise-dentate. Racemes 1- to 5-flowered. Corolla 2-4 mm long. Legume 6-10 mm in diameter, in a spiral of 2-3 turns, discoid, glabrescent, not spiny; transverse veins scarcely anastomosing, becoming strongly thickened towards the strong marginal vein. Fl. 3-5.

Rocky ground and fields. Malta and Gozo: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region.

8. *M. tornata* (L.) Miller

M. obscura Retz; *M. helix* Willd.

Fig. 25

Hairy Medick

More or less patent, pubescent annual up to 60 cm high. Leaflets obovate, cuneate, dentate near the apex; stipules lanceolate, dentate to lacinate near the base. Racemes 1- to 10-flowered. Corolla 5-7 mm long. Legume 5-7 mm in diameter, in a spiral of 1½ - 8 turns. Lenticular to cylindrical, flat at both ends, glabrous, spiny or not; transverse veins scarcely anastomosing except near the margin of vein, where they form a submarginal vein from which the spines, if present, arise; spines conical, usually short, but up to ¼ as long as the diameter of the legume, patent, straight or uncinat. Fl. 3-4.

Rocky ground and fields. Malta: Kordin (GD; Borg); Wied Gerzuma (Gulia; Borg). Gozo: Wied il-Lunzjata (Gulia; Borg).

W. Mediterranean region; Atlantic Islands.

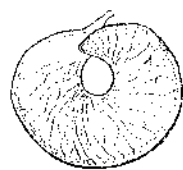
9. *M. marina* L.

Fig. 25

Nefel tax-xtut

Sea Medick

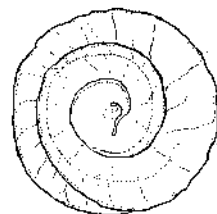
Procumbent, white-tomentose, densely leafy perennial 20-50 cm high. Leaflets obovate, cuneate at base, denticulate at apex; stipules ovate, acuminate, entire or toothed. Racemes almost capitate, 5- to 12-flowered. Corolla 6-8 mm



M. arborea



M. scutellata



M. orbicularis



M. ciliaris



M. lupulina



M. intertexta



M. aculeata



M. rugosa



M. marina



M. littoralis



M. rigidula



M. murex



M. truncatula



M. tenoreana



M. tornata



M. arabica



M. minima



M. turbinata



M. polymorpha



in diameter, in a spiral of 2-3 turns with a small hole through the middle, cylindrical, densely white tomentose; submarginal and marginal veins thick, with 2 rows of short, conical spines. Fl. 3-5.

Sandy sea shores. *Malta*: local (G. Lanfranco), as at Ghadira (S. & C.G.; Borg; Haslam; Kramer & Westra); Ahrax and the Marfa peninsula (S. & C.G.; Borg; Wolseley); Golden Bay (Haslam); Gnejna (S. & C.G.; Borg); St. George's Bay (GD, Borg); St. Thomas' Bay (Gulia; Borg). *Comino*: Qala Santa Marija (Duthie; Borg).

Shores of the Mediterranean, Black Sea and Atlantic to c. 48°N.

10. *M. truncatula* Gaertner

Plate XX; fig. 25

Mediterranean Medick

Sparsely villous annual up to 50 cm high. Leaflets obovate or obcordate, cuneate, denticulate near the apex; stipules ovate-lanceolate to narrowly lanceolate, incise-dentate to lacinate in the lower half. Racemes 1- to 3 (-5)-flowered. Corolla 5-6 mm long. Legume 5-8 mm in diameter, in a spiral of 3-6 turns, cylindrical, nearly always sparsely villous; spiny; transverse veins scarcely anastomosing, joining a very thick submarginal vein by the groove; spines up to more than half as long as the diameter of the legume, curved or uncinatate, each arising partly from the margin and partly from the submarginal vein. Fl. 2-5.

Fields, valleys, rocky and waste ground. *Malta*, *Gozo* and *Comino*: common everywhere (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region north to W. France; Atlantic Islands.

11. *M. rigidula* (L.) All.

Field Medick

Differs from *M. truncatula* in having corolla 6-7 mm long; legume in a spiral of 4-7 turns, discoid to cylindrical, nearly always densely glandular-pubescent rarely glabrescent, nearly always with spines; transverse veins strongly curved, scarcely anastomosing; submarginal veins at first separated from the marginal vein by a shallow groove, becoming confluent with it and forming a convex margin when fully ripe; spines usually about half as long as the diameter of the legume, somewhat curved, uncinatate. $2n = 14, 16$. Fl. 3-5.

Rocky ground. *Malta*: Selmun (Kramer & Westra).

Mediterranean region.

This species may previously have been confused with *M. aculeata*.

12. *M. littoralis* Rohde ex Loisel.

Fig. 25

Nefel

Coastal Medick

Sparsely villous annual up to 40 (-110) cm. high. Leaflets obovate or obcordate, cuneate, dentate towards the apex; stipules lanceolate, incise-dentate. Racemes 1- to 6-flowered. Corolla 5-6 mm long. Legume 4-6 mm in diameter, in a spiral of 3-6 turns, discoid to cylindrical, glabrous, spiny or not; transverse veins nearly straight, scarcely anastomosing except near the submarginal vein; submarginal vein at first separated from the marginal vein by a shallow groove, becoming confluent with it and forming a keeled margin when fully ripe; spines varying from short and conical to half as long as the diameter of the legume, arising from the submarginal vein. Fl. 3-5.

Fields, gardens, valleys and rocky ground. *Malta*, *Gozo* and *Comino*: common everywhere (S. & C.G.; Borg G. Lanfranco; Wolseley).

Mediterranean region extending to W. France; Atlantic Islands.

12. *M. aculeata* Gaertner Fig. 25 Straight-spined Medick
M. turbinata var. *aculeata* (Gaertner) Moris;
M. turbinata Willd., non (L.) All.

Differs from *M. littoralis* in having stipules ovate-lanceolate; legume 7-10 mm in diameter, in a spiral of 5-7 turns, globose to ellipsoid, with dense, short, sometimes glandular hairs, sometimes glabrescent, spiny or not; transverse veins somewhat curved; and spines usually conical, straight or curved. Fl. 3-5.

Malta: Wied Bufula, Marsaskala, Cottonera, Buskett, Wardija, Ghajn Rihana (Borg); *Gozo*: Ramla, Nadur, San Blas (Borg).

Mediterranean region extending to Portugal and Bulgaria.

14. *M. turbinata* (L.) All. Fig. 25 Southern Medick
M. tuberculata (Retz.) Willd.

Sparsely villous annual up to 50 cm high. Leaflets obovate, cuneate, dentate near the apex; stipules lanceolate to ovate-lanceolate, dentate to incise-dentate. Racemes 1- to 8-flowered. Corolla 5-6 mm long. Legume 5-7 mm in diameter, in a spiral of 5-6 turns, cylindrical or somewhat conical, glabrous, spiny; transverse veins slender, curved, not or rarely anastomosing, ending at a veinless border $\frac{1}{2}$ - $\frac{2}{3}$ as wide as the radius of the spiral; marginal vein forming a keel; spines usually short, broad, obtuse, rarely acute and up to $\frac{1}{2}$ as long as the diameter of the legume. Fl. 3-5.

Fields and waste places. *Malta*: not frequent (G. Lanfranco) as at Wied Gerkum, St. Paul's Bay, Wardija, Pwales, Bahrtja, etc. (Borg). *Gozo*: frequent (Borg).

Mediterranean region extending to Portugal and Bulgaria.

15. *M. murex* Willd. Fig. 25 Spiny Medick

Differs from *M. turbinata* in having leaflets obcordate or obtriangular, corolla 4-5 mm long; legume 5-9 mm in diameter, in a spiral of 5-9 turns; sometimes not spiny; submarginal and marginal veins distinct, forming 3 keels; spines usually longer and less conical. Fl. 3-5.

In fields, along country roads and in valleys. *Malta*: not common, as at Wied Inčita, Mraħleb, Wied Babu, Ta' Baldu, Wardija, San Martin (Borg).

Mediterranean region.

16. *M. arabica* (L.) Hudson Fig. 25 Spotted Medick

Sparsely pubescent to glabrous annual up to 50 cm high. Leaflets usually obcordate, cuneate, dentate near the apex, usually with a dark spot. Racemes 1-4 (-6)-flowered. Corolla 5-7 mm long. Legume (4-) 5-6 mm in diameter, in a lax spiral of 4-7 turns, subglobose to shortly ellipsoid, somewhat flattened at both ends, glabrous, usually spiny; transverse veins curved, anastomosing; forming a tangentially elongated network near the margin; margin with

grooves, the lateral deeper and wider than the central; spines usually $\frac{1}{2}$ - $\frac{2}{3}$ as long as the diameter of the legume, deeply sulcate. Fl. 2-5.

Moist valleys. *Malta*: rare (G. Lanfranco) as at Ghajn il-Kbira (S. & C.G.; Borg); Mellieħa (Duthie; Borg). *Gozo*: Xlendi (S. & C.G.; Borg).

Mediterranean region, north to Britain; W. Asia; introduced elsewhere.

17. *M. polymorpha* L. Fig. 25 Nefel
M. hispida Gaertner; *M. denticulata* Willd. Toothed Medick

Glabrous or pubescent annual up to 40 cm high. Leaflets obovate to obcordate, cuneate, dentate near the apex; stipules lanceolate to ovate-lanceolate, incise-dentate. Racemes 1- to 5 (-8)-flowered. Corolla 3-4.5 mm long. Legume 4-8 (-10) mm in diameter in a lax spiral of $1\frac{1}{2}$ - 6 turns, usually glabrous and spiny; transverse veins strong, anastomosing freely, at least near the submarginal vein; submarginal vein conspicuous, separated from the marginal vein by a deep groove, the margin consequently with 3 keels separated by 2 grooves, spines absent or up to more than the diameter of the legume in length, each arising from both the submarginal and marginal veins and therefore deeply sulcate. $2n = 14$. Fl. 1-6.

Fields, gardens, valleys and road edges. *Malta*, *Gozo* and *Comino*: common (Borg). *Selmun*: (Kramer & Westra).

Mediterranean region north to Britain; Asia.

18. *M. tenoreana* Ser. Fig. 25 Italian Medick

Softly pubescent annual 10-40 cm high. Leaflets obovate, cuneate, dentate near the apex; stipules lanceolate, dentate near the base. Racemes 1- to 4-flowered. Corolla 4-5 mm long. Legume c. 5 mm in diameter, in a lax spiral of 4-5 turns, shortly cylindrical, flat at both ends; transverse veins anastomosing to form a network, with a wide veinless border; turns of the spiral all subequal and spiny; spines in 2 rows, one upward- and one downward-pointing parallel to the legume, nearly straight. Fl. 3-4.

Arid rocky places. *Malta*: Gharghur, Kordin (GD.; Borg); Cottonera (Gulla; Borg).

W. Mediterranean region.

19. *M. minima* (L.) Bartal Fig. 25 Nefel zghir
 Bur Medick

Villous annual up to 40 cm high. Leaflets obovate or obcordate, dentate near the base. Racemes 1- to 6 (-8)-flowered. Corolla 4-4.5 mm long. Legume 3-5 mm in diameter, in a lax spiral of 3-5 turns, subglobose, sparsely villous and somewhat glandular, nearly always spiny; transverse veins slender, curved, not anastomosing; submarginal vein wide, separated from the narrow, flat or convex marginal vein by a wide groove; spines very short to longer than the diameter of the legume, patent, usually uncinat, deeply sulcate at base. $2n = 16$. Fl. 2-5.

Arid rocky ground and waste places. *Malta*, *Gozo* and *Comino*: common (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Cominotto* (Duthie).

West of Europe except the north; W. Asia; N. Africa; Canary Islands.

19. Trifolium L.

Annual, biennial or perennial herbs, rarely somewhat woody. Leaves 3-foliate, very rarely digitate with 5 (-8) leaflets; leaflets usually toothed. Flowers in heads or short spikes, very rarely solitary. Calyx-teeth equal or unequal; petals persistent or deciduous, adnate to each other and to the staminal tube; stamens diadelphous; all or 5 of the filaments dilated at the apex. Legume included in the calyx or shortly exerted, rarely much exceeding the calyx, indehiscent or dehiscent by a ventral suture or by an indurated lid. Seeds 1-4 (-10).

1. Calyx with 5 (-6) veins; leaves often pinnately 3-foliate; corolla always persistent and scarious in fruit
Calyx with more than 5 (-6) veins, usually 10, 20 or more; leaves digitately 3-foliate; petals deciduous or marcescent, sometimes scarious

2. Corolla 8-13 mm long
Corolla 3-7 mm long

3. Flowers sub-sessile; upper calyx-teeth shorter than upper limb of the calyx-tube
Flowers with pedicels half as long as the calyx tube; upper calyx-teeth as long as the upper limb of the calyx-tube

4. Flowers subtended by small, sometimes connate, bracts; throat of calyx not closed by a ring of hairs or by an annular or bilabiate callosity; legume usually 2- to 8-seeded, included or exerted
Flowers ebracteate but head sometimes involucrate; throat of the calyx usually more or less closed by a ring of hairs or an annular or bilabiate callosity at maturity; legume 1- to 2-seeded, almost always included in the calyx tube

5. Calyx-tube not inflated in fruit
Calyx-tube slightly to conspicuously inflated in fruit

6. Corolla 6-9 mm long
Corolla 3-4 mm long

7. Perennial
Annual

8. Fruiting calyx glabrous, inflated more or less equally on all sides; bracts prominent, glumaceous striate; heads pseudoterminal

- Fruiting calyx pubescent, tomentose or lanate (sometimes finally glabrescent), adaxially gibbous; bracts inconspicuous and more or less concealed; heads lateral

9. Fruiting heads more or less pedunculate; calyx pyriform, pubescent to tomentose, finally glabrescent, its 2 upper teeth evident, divergent

1. repens

8. aureum

9. campestre

2. nigrescens

3. suffocatum

5. fragiferum

4. spumosum

6. resupinatum

Fruiting heads subsessile; calyx more or less globose, lanate, its 2 upper teeth more or less concealed

7. tomentosum

10. Fertile flowers 2-12, sterile flowers developing after anthesis; fruiting heads appressed to the ground or subterranean

21. subterranean

Fertile flowers usually numerous, sterile flowers absent

11.

11. All or at least some calyces evidently 20-veined, or the 20 veins completely obscured by dense sericeous hairs
Calyx 10-veined, or some calyces with up to 14 veins

12.

14.

12. Stems less than 4 cm long; heads crowded
Stems 5-40 cm long; heads solitary

15. congestum

13.

13. Corolla 7-8 mm long
Corolla 12-15 mm long

14. lappaceum

13. cherleri

14. Perennial
Annual

13. pratense

15.

15. Heads sessile, axillary or terminal, involucrate
Heads pedunculate, terminal or axillary

16.

18.

16. Lateral veins of the leaflets recurved and prominent at the leaf margins
Lateral veins not obvious

11. scabrum

17.

17. Calyx-tube campanulate, glabrous or sparsely hairy above; leaflets 10-20 mm long
Calyx-tube ovoid, densely hairy; leaflets 20-40 (-70) mm long

19. squamosum

20. squarrosum

18. Upper leaves alternate
At least the two uppermost leaves opposite

19.

21.

19. Corolla c. 4 mm long, much shorter than calyx
Corolla 8-12 mm long, equalling calyx-teeth

10. arvense

20.

20. Leaflets 8-12 mm long, obcordate
Leaflets (10-) 20-80 mm long, linear-lanceolate

12. stellatum

13. angustifolium

21. Calyx teeth 1-veined or 3-veined only at the base; corolla at least twice as long as the calyx
Calyx teeth distinctly 3-veined to the middle or above; corolla equalling or slightly exceeding the calyx

18. echinatum

22.

22. Calyx-tube campanulate, glabrous or sparsely hairy above; leaflets 10-20 mm long
Calyx-tube ovoid, densely hairy; leaflets 20-40 (-70) mm long

19. squamosum

20. squarrosum

Subgen. *Lotoidea* Pers. Flowers subtended by free or united bracts (or short glandular hairs). Calyx-throat open, without a ring of hairs or a callosity. Legume included in the calyx or exserted. Seeds (1-) 2-4 (-10).

Sect. *Lotoidea*. Annual or perennial. Flowers umbellate, rarely spicate, numerous, pedicellate, subtended by lanceolate, membranous bracts. Calyx-teeth unequal. Legume (1-) 2- to 4 (-5) seeded.

1. *T. repens* L.

White Clover

Glabrous or glabrescent perennial, usually with extensively creeping stems rooting at the nodes. Leaflets usually bright green with either light or dark marks along the veins, or both; lateral veins translucent in the living plant. Stipules large, membranous, sheathing, contracted into a subulate apex. Heads usually globose. Flowers scented; calyx teeth narrowly lanceolate, the 2 upper longer than the rest, separated by narrow acute sinuses; corolla 8-13 mm long, white or pink, becoming light brown and strongly deflexed after anthesis; standard ovate-lanceolate. Legume linear, compressed, constricted between the 3-4 seeds. Fl. 3-5.

Malta: Wied Qirda (GD.; Borg); Marsa (Gulia; Borg).

Europe to 71°N; W. Asia; N. Africa; introduced in S. Africa, Atlantic Islands, America and E. Asia.

2. *T. nigrescens* Viv.

Xnejn abjad Small White Clover

Glabrous or glabrescent annual; stems 5-40 cm high, often numerous, procumbent, erect or ascending. Leaflets 8-15 (-25) mm long, obovate or obcordate. Stipules triangular-lanceolate, acuminate. Heads 10-20 mm wide, globose, lax, peduncles longer than the leaves; pedicels equalling or longer than the calyx tube, deflexed in fruit. Calyx-tube lanceolate or linear, without wide sinuses between the upper teeth usually slightly longer than the others and equalling or exceeding the tube. Corolla 6-9 mm long, white, cream or pink, becoming brown. Legume 1- to 5-seeded. $2n = 16$. Fl. 3-5.

Cultivated and waste places. Malta, Gozo and Comino: very common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

S. Europe; N. Africa; W. Asia.

3. *T. suffocatum* L.

Plate XX

Xnejn mohbi Suffocated Clover

Glabrescent caespitose annual; stems 1-3 (-5) cm long, procumbent. Internodes rarely reaching 5 mm long. Leaflets 3-8 mm long, obovate-cuneate, emarginate; petioles 10-60 mm long; stipules ovate, acuminate. Heads 5-6 mm wide, sessile, numerous, usually confluent, rarely somewhat separated, then ovate. Calyx sparsely pubescent at first, glabrescent; teeth all as long as the tube, lanceolate or subulate, recurved; corolla 3-4 mm long, white; standard a little shorter than the calyx. Legume 2-seeded.

In arid localities. Malta and Gozo: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region, north to England in the west.

Sect. *Mistyllus* (C. Presl) Godron. Glabrous annuals. Heads pseudoterminal with prominent, glumaceous, striate, free bracts. Calyx 20- to 35-veined, inflated more or less equally on all sides in fruit; teeth setaceous, recurved. Legume included, 1- to 4-seeded.

4. *T. spinosum* L.

Mediterranean Clover

Stems 10-30 (-50) cm long, procumbent or ascending. Leaflets 10-20 (-30) mm long, broadly obovate-cuneate, thin, not strongly veined, denticulate. Heads globose to ovate; peduncles 10-40 (-100) mm long. Bracts conspicuous, shorter than the mature calyx-tube. Calyx tube much inflated, pyriform, with transverse as well as longitudinal striations; corolla pink, slightly exceeding the calyx. Legume 3- to 4-seeded. Fl. 3-5.

Malta: Wied Balluta (GD.; Borg).

Mediterranean region; W Asia.

Sect. *Vesicastrum* Ser. Bracts free or united into a small involucre. Flowers sessile. Calyx inflated in fruit, upper lip externally densely hairy (rarely glabrous), scarious and reticulate veined, its two teeth often setaceous.

5. *T. fragiferum* L.

Strawberry Clover

Usually more or less hairy perennial; stems (2-) 10-30 (-40) cm long, several, procumbent, often rooting at the nodes, rarely caespitose with stems short and not rooting. Leaflets (3-) 8-20 mm long, ovate, elliptical or obcordate. Stipules lanceolate-subulate, membranous. Heads 10-14 mm wide, hemispherical in flower, 10-22 (-25) mm, globose, ellipsoid or irregularly cylindrical in fruit; peduncles up to 260 mm long, often hairy, exceeding the leaves. Bracts 3-4 mm long, whorled, the lowest ones united below, forming a deeply dissected, irregular involucre. Upper lip of calyx-tube greatly inflated in fruit; corolla 6-7 mm long, pale pink. Legume included, 1- to 2-seeded. Fl. 5-9.

Along ditches and roads in moist localities. Malta: infrequent (G. Lanfranco), as at Mthleb, Grgenti, Attard, Floriana (S. & C.G.; Borg), Wied Inqta, Hal-Lija (GD.; Borg); Mrieħel, Wied Mosta (Borg); Wied Qannotta (Gauci). Gozo: Xlendi, between Zebbug and Marsalforn (S. & C.G.; Borg); Wied il-Lunzjata (Gulia; Borg); Qbajjar, Ramla, Mgarr (Borg).

Europe, to about 60° 30'N; W Asia; N. Africa; Atlantic Islands.

6. *T. resupinatum* L.

Reversed Clover

Glabrous annual; stems 10-30 (-60) cm long, procumbent, ascending or erect. Leaflets 7-20 mm long, obovate-cuneate. Bracts minute, united at the base. Flowers resupinate, scented or scentless. Heads in fruit 8-20 (-25) mm wide, globose, stellate; peduncles shorter than to twice as long as the leaves. Calyx 5-10 mm long in fruit, pyriform, sparsely pubescent to tomentose, glabrescent, crowned by the two divergent upper calyx-teeth; corolla 2-8 mm long, pink, rarely reddish-purple. Fl. 4-6.

Uncultivated rocky ground. Malta, Gozo and Comino: common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Probably native in W. Asia; widely introduced in C., W. and S. Europe.

7. *T. tomentosum* L.

Xnejn tar-raba
Hop Trefoil

Differs from *T. resupinatum* in plant being caespitose; stems not more than 15 cm long, usually procumbent; fruiting heads 7-11 (-14) mm wide, subsessile; upper lip of calyx almost spherical in fruit, lanate, its two teeth short and usually concealed. Fl. 4-5.

Arid, rocky places. *Malta, Gozo and Comino*: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region; W. Asia.

Sect. *Chromosemium* Ser. Leaves often pinnately 3-foliolate. Bracts represented by a few, short, red glandular hairs. Calyx 5-veined, upper teeth shorter than lower. Corolla eventually darkening, persistent and scarious. Legume stalked, slightly exceeding calyx, 1 (-2) seeded.

8. *T. aureum* Pollich

T. agrarium L. nom. ambiguum
T. campestre auct.

Golden Trefoil

Robust biennial; stems 15-30 (-40) cm high, many, erect and branched, usually appressed hairy. Leaflets up to 15 mm long, oblong-ovate or rhombic, widest near the middle, the terminal one nearly sessile. Stipules lanceolate-ovate, not dilated below. Peduncles up to 50 mm long, stout, equalling or exceeding the leaves. Heads up to 16 mm wide, dense, many-flowered. Flowers nearly sessile. Upper calyx-teeth shorter than the upper limb of the calyx-tube. Corolla 6-7 mm long, golden-yellow; limb of standard obovate, sulcate. $2n = 16$.

This species is almost certainly not in the Maltese Islands, but its description is included as Borg does not separate it from *T. campestre*, and it may be present.

Much of Europe, but absent from most of N., W. and Mediterranean region; W. Asia.

9. *T. campestre* Schreber

Xnejn in-xaxlet
Rough Clover

Annual, stems up to 30 (-50) cm high, hairy, erect or ascending. Leaflets 8-10 mm long, obovate, the terminal one petiolate. Stipules semi-ovate, dilated and round at the base. Heads up to 15 mm wide, dense, 20- to 30-flowered; pedicels half as long as the calyx-tube. Upper calyx-teeth as long as or shorter than the upper limb of the calyx-tube; lower calyx-teeth 1-2 times as long as the lower limb of calyx tube. Corolla (3-) 4-5 (-6) mm long, yellow; limb of standard broadly cochleate, sulcate. Legume 3-6 times as long as the style. $2n = 14$. Fl. 3-5.

Fields and rocky waste land. *Malta*: common everywhere (Borg; G. Lanfranco; Wolseley).

Europe, except the extreme north and east; W Asia; N. Africa; Atlantic Islands; introduced in N. America.

Subgen. *Trifolium* Flowers ebracteate. Calyx throat usually more or less closed with a ring of hairs or an annular or 2-lobed callosity. Legume nearly always included in the calyx-tube, 1- to 2-seeded.

Sect. *Trifolium*. Heads usually spicate, rarely capitate. Flowers usually sessile.

10. *T. arvense* L.

Haresfoot Clover

Annual or biennial; stems 4-40 cm high, erect or diffusely branched, whitish or reddish-pubescent, rarely glabrescent. Upper leaves sessile, their leaflets 5-20 mm long, linear-oblong. Lower stipules lanceolate-subulate, the upper subulate from an ovate base. Heads up to 20 mm wide, numerous, ovoid or oblong, pediculate, with numerous, densely sericeous flowers. Calyx 3.5-7 (-9) mm long, the tube globose in fruit, often covered with dense hairs, rarely glabrescent; teeth 1-3 (-5) times as long as the tube, reddish, subequal, setaceous, with long hairs. Corolla c. 4 mm long, whitish or pink, much shorter than the calyx. $2n = 14$. Fl. 3-5.

Malta: very rare at Kordin (GD; Borg); Mellieha and Guejna (Gollia; Borg); Addolorata Cemetery (Lanfranco).

Throughout Europe, except the extreme N.; W. Asia; N. Africa; Atlantic Islands; naturalised in N. America.

11. *T. scabrum* L.

Xnejn in-xaxlet
Rough Clover

Annual; stems 5-25 cm long, rigid, flexuous, numerous, procumbent or ascending. Leaflets 5-10 mm long, obovate-cuneate, coriaceous, denticulate; lateral ones recurved and prominent at the margins. Stipules ovate or oblong with mucous apex, entire. Heads 2-12 mm in diameter, numerous, mostly axillary, sessile, globose or ovoid, attenuate and scarcely clasped at the base by the stipules. Calyx persistent in fruit; teeth rigid, spinose, slightly recurved in fruit, the lowest the longer than the tube. Corolla 4-5 mm long, whitish, rarely pink, usually shorter than the calyx. $2n = 10$. Fl. 3-5.

Rocky uncultivated places, roadsides. *Malta, Gozo and Comino*: common everywhere (S. & C.G.; G. Lanfranco; Borg). *Cominotto* (Duthie; Borg).

Europe from the Netherlands southwards; Mediterranean region; W. Asia; Atlantic Islands.

Plants from Wied Ghomor, and Sliema on *Malta* and Ta' Cene on *Gozo* have been described by Borg as *T. lucanum* Gasparr. ex Guss. They differ from *T. scabrum* as follows: flowering heads cylindrical, more recurved calyx-teeth and pink corolla slightly exceeding the calyx. They may merit sub-specific rank.

12. *T. stellatum* L.

Xnejn Stilla
Starry Clover

Annual; stems (2-) 8-20 (-35) cm high, erect, simple or branching from the base, with dense patent hairs. Leaflets 8-12 mm long, obcordate, denticulate towards the apex; stipules ovate, obtuse, acutely denticulate, the margin and veins bright green. Heads 15-25 mm wide, globose or ovoid; peduncles (3-) 30-100 mm long, with appressed or patent hairs. Calyx-teeth twice as long as the tube, patent in fruit, 3-veined, triangular-lanceolate with a subulate-acuminate apex. Corolla 8-12 mm long, pink, rarely purple or yellow, equalling the calyx, rarely much longer. $2n = 14$. Fl. 3-5.

Fields, valleys and uncultivated rocky places. *Malta, Gozo and Comino*: very common everywhere (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Cominotto* (Duthie; Borg).

Mediterranean region; W. Asia.

13. *T. pratense* L.

Red Clover

Perennial, caespitose, more or less hairy; stems 5-100 cm high. Leaflets, obovate or oblong-lanceolate to nearly orbicular, hairy below, often glabrescent above. Stipules triangular above, abruptly contracted into a setaceous usually ciliate point; upper stipules very wide. Heads 20-40 mm wide, globose or ovoid, solitary or paired, usually sessile and involucre. Calyx-tube 10-veined, usually appressed hairy; teeth triangular with filiform apex, straight, ciliate, separated by broad sinuses, the lowest one about twice as long as the tube. Corolla 12-15 mm long, usually reddish-purple or pink, rarely cream or white, (1-) 2 times as long as the lowest calyx teeth. Legume ovate, with a thickened apex. $2n = 14$. Fl. 4-6.

Probably accidental. *Malta*: Wied Balluta (GD.; Borg); Marsa, Marsaskala (Gulia; Borg).

Throughout Europe except for parts of the south; W. Asia; Algeria. Widely cultivated, and introduced in other parts of the world.

14. *T. lupulaceum* L.

Bur Clover

Annual, bright green, with numerous usually branched, glabrescent, erect or ascending stems 5-40 cm high. Leaflets 5-20 mm long, obovate-cuneate, obtuse hairy. Stipules oblong, conspicuously veined; apex long, lanceolate or subulate herbaceous, hairy. Heads 12-20 mm wide, globose, rarely ovoid; peduncles up to 35 mm long in fruit. Calyx-tube with 20 conspicuous veins, glabrous or glabrescent, rarely hairy; teeth 3.5-6 mm long, longer than the tube, prominently 5-veined and triangular below, filiform and hairy above. Corolla 7-8 mm long, pink, equalling the calyx at anthesis, much shorter than the calyx in fruit. Legume ovate with a thickened apex. Fl. 4-6.

Rocky uncultivated ground and field margins. *Malta*: rather rare. St. Paul's Bay, Ta' Baldu, Wied Gerzuma (S. & C.G.; Borg); Mellieha (Reade; S. & C.G.; Borg); Wied il-Ghasel (Borg); Pwales, Wardija, Ghajn Znuber (Borg); Mtahleb (Walsely).

Mediterranean region; W. Asia; Atlantic Islands.

15. *T. congestum* Guss.

Crowded Clover

Annual, stems 1-3 cm long, numerous, stout, woody, procumbent, glabrous. Leaflets 5-9 mm long, narrowly cuneate, deeply emarginate, obscurely denticulate, densely appressed-pubescent above and beneath; petioles up to 30 mm long, stipules membranous, broadly ovate, abruptly contracted into a short point. Heads 8-10 mm wide, pseudo-terminal and axillary, sessile, involucre, more or less congested. Flowers mostly erect. Calyx-tube 20-veined, densely but short pubescent; teeth nearly twice as long as the tube, subulate from a narrow triangular base, glabrous and 5-veined below, with sparse, patent hairs above the middle. Corolla 6-7 mm long, white, not longer than the calyx. Fl. 4-5.

Fields. *Malta*: Wied Ghomor (GD.; Borg); Cottonera (Gulia; Borg).

S. Italy; Sicily.

16. *T. cherleri* L.

Southern Clover

Annual, stems 5-15 (-30) cm high, rarely branching above; hairs patent. Leaflets 8-20 mm long, obcordate-cuneate, almost entire. Stipules lanceolate with a short, ovate-lanceolate, herbaceous and often recurved apex. Heads 15-

(-25) mm wide, hemispherical, readily abscissing below the involucre in fruit. Calyx 20-veined, the veins obscured by dense hairs; teeth more or less equalling the tube. Corolla 12-15 mm long, pinkish white, equalling or shorter than the calyx. Fl. 3-5.

Arid places. *Malta*: very rare, Wied Babu (GD.; Borg); Marsaskala (Gulia; Borg). *Gozo*: Wied il-Lunzjata (Gulia; Borg).

Mediterranean region; Atlantic Islands.

17. *T. angustifolium* L.

Xnejn tal-werqa irqika
Narrow-leaved Clover

Annual; stems 10-50 cm high, appressed-hairy, few, one often taller and stiffer erect, the others shorter and ascending, branching at the base. Leaflets (10-) 20-80 x (1-) 2-4 mm, linear-lanceolate, acute; stipules lanceolate-subulate. Heads (15-) 20-80 mm in diameter, solitary, ovoid or conical-cylindrical; peduncles (10-) 20-40 (-60) mm long. Calyx-teeth subequal, linear or subulate, finally patent, ciliate, the apex glabrous or with a few short hairs. Corolla 10-12 mm, pink, shorter than or equalling the calyx-teeth. Fl. 4-6.

Arid rocky ground. *Malta*: rare (G. Lanfranco), as at St. Paul's Bay, Buskett, Wied Ghomor (S. & C.G.; Borg); Wied Hanzir (S. & C.G.); Ghajn Mula, Tarxien, Birzebuga, Ghajn il-Kbira (Borg); *Gozo*: Ta' Cent, Mgarr ix-Xini (S. & C.G.); Xaghra (Borg).

Mediterranean region; Atlantic Islands.

The plant known under the illegitimate name *T. intermedium* Guss., non Lapeyr. is like *T. angustifolium* but has stems 10-20 cm high, leaflets 10-20 mm long, narrowly elliptical or lanceolate; calyx-teeth subequal, more or less evenly ciliate from the base to the apex. It may merit subspecific rank.

Malta: Kordin, Mtahleb, Wied Incita (S. & C.G.; Borg); Attard, Verdala, Dingli (Borg).

18. *T. echinatum* Bieb.

Xnejn xewki
Spiny Clover

Annual; stems 10-60 cm long, procumbent or ascending, sparsely to densely hairy or glabrous. Leaflets 8-25 x 4-12 mm, obovate or oblanceolate; stipules short. Heads 8-15 mm in diameter in flower, ovoid or globose; peduncles 20-50 (-80) mm long. Fruiting calyx with tube 1.5-2 mm long, campanulate or obconical, sparsely hairy or glabrous, the furrows between the 10 veins not reaching the widened mouth of the tube; teeth linear-subulate, 1-veined or 3-veined only at the base, stiff and spinose, the lowest much longer than the others and twice as long as the tube. Corolla 8-12 mm long, pink or cream, at least twice as long as the calyx. Legume included. Fl. 4-5.

Malta: rare near Attard (S. & C.G.; Borg); San Anton (C. & C.G.; Borg); Floriana (Borg).

Balkan peninsula extending to Italy and S. Roumania; W. Asia.

19. *T. squamosum* L.
T. maritimum Hudson

Sea Clover

Annual; stems 10-40 cm long, procumbent or erect, hairy or glabrescent. Upper leaflets 10-20 x 6-8 mm., narrowly obovate-cuneate or oblong, often apiculate. Stipules linear, the free herbaceous part longer than the rest. Fruiting heads 10-20 mm long, ovoid; peduncles up to 20 mm long. Fruiting calyx tough, with a campanulate tube, glabrous or thinly hairy above the 10 veins and furrows disappearing below the dilated mouth; teeth lanceolate-acuminate, spreading, herbaceous, the lowest distinctly 3-veined, about $\frac{1}{2}$ as long as the tube. Corolla 5-7 mm long, pale pink, exceeding the calyx. Legume included. Fl. 4-5.

Damp, grassy places. *Malta*: rare, Floriana, between Fiddien and Mthieb (S. & C.G.; Borg).

Mediterranean region; W. Europe; W. Asia.

20. *T. squarrosum* L.
incl. var *dispaceum* Thuill.

Squarrose Clover

Robust annual, stems 20-80 cm high, erect or ascending, appressed hairy or glabrous. Leaflets 20-40 (-70) x 8-15 mm, oblong. Stipules 20-50 mm long, with a herbaceous, linear, 3-veined, free apex; marginal hairs dilated at the base. Heads 15-30 mm wide, ovoid; peduncles (0-) 10-60 mm long. Calyx-tube ovoid, contracted at the mouth, densely hairy; teeth triangular-lanceolate, herbaceous, 3-veined, the lowest wider, twice as long as the others, deflexed in fruit, marginal hairs dilated at the base, so that the calyx-teeth appear finely denticulate. Corolla 9-12 mm long, pale pink or white, equalling or slightly exceeding the lowest calyx-tooth. Legume included. Fl. 3-5.

Grassy places. *Malta*: Tarxien near neolithic temple, first found April 1923 (Borg).

Mediterranean region.

Sect. *Trichocephalum* Koch. Heads capitate; flowers sessile, ebracteate, the outer fertile, the inner consisting of only sterile calyces.

21. *T. subterraneum* L.

Xnejn midfun
Subterranean Trefoil

Annual; stems up to 20(-30) cm long, numerous, procumbent. Leaflets broadly obovate; petioles usually long; stipules semi-ovate. Fruiting heads glabrous, appressed or buried in the soil by the long deflexed peduncles. Fertile flowers 2-5(-7); corolla 8-14 mm long, whitish. Sterile flowers numerous, developing after anthesis, becoming strongly deflexed over the fruiting calyces. Legume 1-seeded, ovoid, somewhat exserted. $2n = 16$. Fl. 3-5.

Arid, rocky and sandy places. *Malta*: local (G. Lanfranco), at Salini (Amalige; S. & C.G.); fortifications of Valletta and Floriana (G.D.; Borg); Ta' Xbiex (Gulia; Borg); Buskett, Dingli, Naxxar (Borg). *Gozo*: Qala (Duthie; Borg), Ghadel at Rabat (Borg).

Mediterranean region and W. Europe.

20. *Lotus* L.

Annual or perennial herbs, often woody at base. Leaves imparipinnate. Leaflets 5, the lowest pair resembling stipules, rarely one of the lowest pair absent; stipules membranous, minute. Flowers solitary or in heads. Calyx campanulate or tubular-campanulate, actinomorphic or bilabiate; keel beaked; stamens androphous. Legume cylindrical, sometimes compressed, dehiscent. Seeds numerous.

- | | |
|--|---------------------|
| 1. Calyx more or less bilabiate, the lateral teeth usually shorter than the rest, the upper teeth usually curved upwards | 2. |
| Calyx not bilabiate, the teeth all more or less equal, but sometimes curved | 4. |
| 2. Annual; legume torulose, curved | 6. ornithopodioides |
| Perennial; legume straight or slightly curved | 3. |
| 3. Lateral calyx-teeth obtuse, much shorter than the upper; keel with a short, curved beak | 3. cytisoides |
| Lateral calyx-teeth acute, only slightly shorter than the upper; keel with a long straight beak | 4. creticus |
| 4. Flowers usually borne singly; legume 4-8 mm in diameter, sulcate on back | 2. edulis |
| Flowers usually borne in heads 2- to 9-flowered; legume 1-3 mm in diameter, not sulcate on back | 3. |
| 5. Perennial herb with woody stock; corolla 8-18 mm long | 1. corniculatus |
| Annual herb; corolla 5-8 mm long | 5. halophilus |

- | | |
|---|--------------------------|
| 1. <i>L. corniculatus</i> L. sensu lato | Ghanfux |
| | Common Birdsfoot-trefoil |

Perennial herbs usually with woody stock. Calyx-teeth usually more or less equal, but sometimes curved; Corolla 8-18 mm long, yellow, sometimes orange or red and yellow. Legume cylindrical, straight. Seeds many. Fl. 3-6

A widespread variable group containing diploid and tetraploid species. It is sometimes treated as a single species with a number of subspecies and varieties. The *Malta* plants are probably referable to *L. preslii* Ten.

Valleys and winter-wet places. *Malta*: local (G. Lanfranco) as at St. Paul's Bay, Fiddien, Pwales, Salini (Borg); Wied Balluta (G.D.; Borg); Mthieb (Borg; S. & C.G.); Ghadira (Self).

Throughout Europe; Asia; N. & E. Africa.

- | | | |
|------------------------|----------|--------------------------|
| 2. <i>L. edulis</i> L. | Plate XX | Qrempu |
| | | Edible Birdsfoot-trefoil |

Sparsely pubescent annual, 10-50 cm high. Leaflets 5-16 x 35-10 mm, obovate or obovate-oblong. Heads 1- to 2-flowered; peduncles longer than leaves. Calyx-teeth subequal, longer than tube. Corolla 10-16 mm, yellow. Legume 20-40 x 4-8 mm, curved. $2n = 14$. Fl. 3-5.

Cultivated ground, field margins and waste places. *Malta*, *Gozo* and *Comino*: very common (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Filfa*: (S. & C.G.; Borg).

Mediterranean region; S. Portugal.

3. *L. cytoides* L.

L. creticus var. *cytoides* (L.)

Grey Birdsfoot-trefoil

Perennial up to 50 cm high. Leaflets 4-14 x 2-8 mm, obovate to oblong-ovate, distinctly shorter than the upper. Corolla 6-7.5 mm long, the lateral teeth obtuse, distinctly shorter than the upper. Corolla 8-14 mm long, standard emarginate; wings slightly longer than keel; keel with a short curved purple beak (about as long as the rest of the keel). Legume 20-50 x 1.5-2 mm, straight or slightly curved. $2n = 14$. Fl. 2-6.

Maritime rocks. *Malta*: local (G. Lanfranco), as at Wied Babu, Wied ix-Zurrieq, St. Paul's Bay, San Martin, Ghajn Tuffieha, Majesa (Borg). *Gozo*: Xlendi (Borg); Mgarr ix-Xini (Borg; Kramer & Westra).

Mediterranean region.

4. *L. creticus* L.

Ghantux tax-xtul

Perennial up to 50 cm high. Leaflets 7-18 x 4-9 mm, obovate to oblong-lanceolate, densely sericeous. Heads (1-) 2- to 6-flowered. Calyx 7.5-9 mm long, the lateral teeth acute, almost as long as the upper. Corolla 12-13 mm long, standard entire; wings much longer than keel; keel with a long, straight, purple beak (up to twice as long as the rest of the keel). Legume 20-50 x 1.5-2 mm, straight or slightly curved. $2n = 28$. Fl. 2-6.

Maritime rocks. *Malta*, *Gozo* and *Comino*: common, often abundant (S. & C.G. Borg; G. Lanfranco; Wolseley). *Cominotto* and *Selmunett*: (Borg).

Mediterranean region; Portugal.

5. *L. holophilus* Boiss. & Spruner

L. pusillus Viv., non Medicus

Sea Birdsfoot-trefoil

Pubescent annual 10-30 cm high. Leaves sessile or shortly petiolate; leaflets 3-7 x 1.5-3 mm, oblong-ovate. Heads 1- to 9-flowered; peduncles longer than leaves. Lateral calyx-teeth slightly shorter than upper. Corolla 5-8 (-9) mm long. Legume 20-30 x 1.5-2 mm, slightly torulose; curved at apex. Fl. 3-4.

Maritime sands and rocks. *Malta*: rare (G. Lanfranco), as at peninsula of Marfa Mellieha (S. & C.G.; Borg). *Gozo*: Ramla (Duthie; S. & C.G.; Borg); Qbajjar, San Blas (Borg). *Comino*: (S. & C.G.; Borg).

E Mediterranean region, extending to Sicily.

6. *L. ornithopodioides* L.

Ghantux sieq l-ghasfur
Clustered Birdsfoot-trefoil

Pubescent annual 10-50 cm high. Leaves petiolate; leaflets 8-30 x 4-16 mm, the upper 3 obovate to rhombic, the lower 2 ovate-rhombic, cordate to cuneate at base. Inflorescence 2- to 5-flowered; peduncles equaling or slightly longer than leaves. Corolla 7-10 mm long. Lateral calyx-teeth very short, obtuse. Legume 20-50 x 2-3 mm, torulose, curved. $2n = 14$. Fl. 2-5.

Fields, field margins and rocky wastes. *Malta*, *Gozo* and *Comino*: common everywhere (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region.

21. *Tetragonolobus* Scop.

Like *Lotus* but leaves trifoliate; stipules herbaceous; flowers solitary or paired; calyx-teeth equal; legume almost equal in transverse section, with the angles winged or keeled.

1. Peduncles at least as long as the leaves; calyx teeth shorter than tube; corolla yellow or orange
Peduncles shorter than or equaling leaves; calyx-teeth longer than tube, corolla pink, red or purple

2.
3.

2. Flowers solitary; corolla 25-30 mm long; legume 30-60 x 3-5 mm, glabrous or subglabrous
Flowers 1-4 on each peduncle; corolla 17-25 mm long; legume 20-40 x 4-6 mm, pubescent

1. *maritimus*

2. *biflorus*

3. *purpureus*

4. *conjugatus*

3. Calyx-teeth not more than twice as long as the tube; style not membranous-winged at tip

Calyx-teeth 2-3 times as long as tube; style with a unilateral membranous wing at tip

1. *T. maritimus* (L.) Roth

Lotus siliquosus L.

Dragon's teeth

Glabrous or pubescent perennial 10-40 cm high. Leaflets up to 30 x 15 mm long, oblanceolate to obovate; stipules ovate, acute or subobtuse. Peduncles much longer than leaves. Flowers solitary, pale yellow; styles with a unilateral membranous wing at the top. Legume 30-60 x 3-5 mm, glabrous or subglabrous; wings c. 1 mm wide. $2n = 14$.

Malta: Penza Herbarium.

C & S. Europe.

2. *T. biflorus* (Desr.) Ser.

Lotus biflorus Desr.

Two-flowered Dragon'steeth

Differs from *T. maritimus* in being annual; stipules ovate-orbicular, obtuse; flowers 1-4 on each peduncle; corolla 17-25 mm long, deep bright orange; legume 20-40 x 4-6 mm, pubescent. Fl. 3-5.

Fields. *Malta*: Kordin, Wied Qirda, Marsa (Gulia; Borg); Maghlaq (Borg). *Gozo*: Wied il-Lunzjata (GD; Borg).

Italy; Sicily; N.W. Greece; N. Africa.

3. *T. purpureus* Moench

Lotus tetragonolobus L.

Plate XX

Figgiela Hamra

Crimson Dragon's teeth

Pubescent annual 10-40 cm high. Leaflets up to 40 x 25 mm, obovate or obovate-rhombic; stipules ovate, more or less acute. Peduncles shorter than or equaling leaves. Flowers solitary or paired. Calyx-teeth 1-2 times as long as tube; corolla 15-22 mm long, crimson; style not winged at the tip. Legume 30-90 x 6-8 mm, glabrous; wings 2-4 mm wide. Fl. 2-5.

Fields and waste places. *Malta*, *Gozo* and *Comino*: common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Europe, extending northwards to c. 47°N. in Ukraine, W. Asia; N. Africa.

1. *T. conjugatus* (L.) Link
Lefus conjugatus L.

Solitary-flowered Dragon's teeth

Pubescent annual 10-30 cm high. Leaflets up to 25 x 15 mm, obovate or obovate-rhombic, acute or mucronate; stipules ovate, acute. Peduncles shorter than or equalling leaves. Flowers solitary or paired; calyx-teeth 2-3 times as long as tube; corolla 10-20 mm long, bright red; style with a unilateral membranous wing at the tip. Legume 20-40 x 3-6 mm, glabrous with 4 wings or keels up to 2 mm wide. Seeds 3-5 mm in diameter. Fl. 3-5.

Fields. *Malta*: Kordin, Wied Qirda, Marsa (Gulia, GD; Borg).

Sicilia.

22. *Hymenocarpus* Savi

Annual. Leaves simple to imparipinnate; stipules minute, membranous. Inflorescence capitate; calyx campanulate with 5 equal teeth; keel beaked; stamens diadelphous. Legume indehiscent, spirally twisted and flattened so that it is suborbicular; outer margin membranous-winged.

1. *H. circinnatus* (L.) Savi

Plate XX

Spiny Kidney-vetch

Stems up to 30 cm high, densely patent-pubescent. Lower leaves simple, obovate-oblong, upper with 2-3 pairs of leaflets, the terminal much larger than the lateral. Calyx-teeth filiform, much longer than tube; corolla 5-7 mm long. Legume 10-15 mm in diameter, the outer margin often toothed. Fl. 3-4.

Gozo: rare (G. Lanfranco), along the road from Rabat to Marsalforn (S. & C.G.; Ta' Harrax (Gulia; Borg); Ras il-Qala and Rdum il-Kbir near Ramla Bay (Duthie; Borg); Qbajjar, Id-Dahrani (Borg); Nuffara (G. Lanfranco).

Mediterranean region.

23. *Anthyllis* L.

Herbs or shrubs usually with imparipinnate leaves, rarely simple or 3 foliolate. Stipules small, caducous. Flowers usually in dense heads, rarely in fascicles or borne singly in the bract-axils. Calyx tubular, campanulate or constricted near the apex, with equal or unequal teeth; corolla variously coloured; stamens monadelphous, or the upper stamen free for half its length. Legume sessile or stipitate, frequently indehiscent or tardily dehiscent, usually completely included within the persistent calyx. Seeds 1-many.

1. Shrub with woody branches

Herbs sometimes slightly woody at base, but never with woody branches

2. Calyx unequally 5-toothed, the mouth oblique; legume 1-seeded, or if 2-seeded than not constricted between the seeds

Calyx more or less equally toothed, the mouth straight; legume 2-seeded, constricted between the seeds

1. *hermanniae*

2. *vulneraria*

3. *tetraphylla*

1. *A. hermanniae* L.

Plate XX

Malta s-Sewda
Yellow Kidney-vetch

Shrub up to 50 cm high, with tortuous, woody branches, the end of the branches becoming spiny. Leaves simple or 3 foliolate; leaflets oblong spatulate or oblong-ovate, sericeous above, strongly so beneath. Flowers solitary or in axillary fascicles of up to 3 flowers, forming an interrupted raceme. Calyx 3-5 mm long, tubular, the teeth triangular, much shorter than the sparsely sericeous tube. Corolla yellow. Seed 1. Fl. 3-6.

Arid rocky places. *Malta*, *Gozo* and *Comino*: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Cominotto* (Duthie; Borg).

Mediterranean region.

2. *A. vulneraria* L. subsp. *maura* (G. Beck) Lindb.

Sila tal-blat
Kidney-vetch

Annual, biennial or perennial. Lowermost leaves reduced to a terminal leaflet or imparipinnate with a much larger terminal leaflet; upper leaves imparipinnate, equifoliate with 9-13 leaflets. Heads many-flowered, subtended by 2 palmatisect bracts close beneath the flowers. Calyx inflated at anthesis, constricted at the red apex, with 5 unequal teeth and mouth oblique. Corolla red or purple. Legume 1(2)-seeded. Fl. 3-5.

Rocky and arid ground, sometimes forming extensive red carpets. *Malta*, *Gozo* and *Comino*: very common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

The species occurs throughout Europe; W. Asia; N. Africa. Subsp. *maura* is found in the C. & W. Mediterranean region.

3. *A. tetraphylla* L.

Annual Kidney vetch

Procumbent annual. Stems villous to hirsute. Leaves imparipinnate, with (1-) 5 leaflets, the large, more or less obovate terminal leaflet much exceeding the small, lateral leaflets, hairy on both surfaces, much less so above. Flowers in axillary fascicles of 1-7. Calyx 12-15 x 4.5-6 mm, inflated at anthesis, later up to 12 mm wide, gibbous, especially so in fruit, densely sericeous, frequently reddish near the apex, the teeth sub-equal, the mouth of the calyx straight. Corolla yellow, the keel often red at the apex. Legume usually 2-seeded, constricted between the seeds. Fl. 3-5.

In rocky, arid places. *Malta*: locally frequent (G. Lanfranco), as at Marfa, St. Paul's Bay, Wied Gerżuma (S. & C.G.; Borg); Wied Ghomor (GD; S. & C.G.); Wied Inčita (Borg; Wolseley); rocky slopes around Ifagar Qim, Wied il-Ghasel (Wolseley). *Gozo*: Wied ir-Rihan, Wied Bingemma (S. & C.G.; Borg; Wolseley); Pergla, Xaghra, Ta' Cenč (Borg; Wolseley); Munxar (Wolseley). *Comino*: (Borg; Wolseley).

Mediterranean region.

24. *Ornithopus* L.

Annual. Leaves imparipinnate; stipules small, free, linear. Flowers 5, in axillary heads. Calyx tubular or campanulate, with 5 equal teeth; keel obtuse; stamens diadelphous. Legume lomentaceous; terete or compressed, usually constricted between segments, strongly reticulate.

Pubescent; stems 10-50 cm high. Leaflets 7-18 pairs, oblong-elliptical or oblong lanceolate. Heads 3-to 5-flowered; bracts with 7-9 leaflets. Calyx-teeth at least $\frac{1}{2}$ as long as the tube; corolla 5-8 mm long, yellow. Legume 20-50 mm long, curved, more or less compressed, not or only slightly contracted between the segments; segments 3-8, oblong, beak 7 mm long or more, curved. Fl. 2-5.

Malta: rare, Ghajn Dwieli, Kordin, Addolorata Cemetery (Borg).

Mediterranean region; Atlantic Islands.

25. *Coronilla* L.

Annual or perennial herbs or dwarf shrubs. Leaves imparipinnate, rarely simple or trifoliate; stipules various, free, or connate. Flowers in axillary heads. Calyx campanulate, more or less bilabiate; keel acute; stamens diadelphous. Legume lomentaceous, terete or longitudinally ridged or angled, not constricted between the segments.

1. Annual; lower leaves simple or 3 foliolate, the terminal leaflet much larger than the lateral
Shrubs; lower leaves imparipinnate, the leaflets more or less equal

3. *scorpioides*

2.

2. Corolla 14-20 mm long, claw of the standard 2-3 times as long as the calyx.
Corolla 7-12 mm long, claw of the standard equalling or slightly longer than the calyx

1. *emerus*2. *valentina*1. *C. emerus* L.

Pale Crown Vetch

Small shrub up to 100 (-200) cm. high. Leaflets 2-4 pairs, 10-20 mm long, obovate, mucronate, glaucous; stipules 1-2 mm long, free, membranous. Corolla 14-20 mm long, pale yellow; claw of the standard 2-3 times as long as the calyx. Legume 50-110 mm long; segments 3-12, 8-10 mm long. Fl. 2-4.

Rare native in rocky valleys, but frequently cultivated. *Malta*: Wied Babu (S. & C.G.; Borg); Wardija (G.D. and Gulia; Borg). *Gozo*: Ta' Harrax (Borg).

C. & S.E. Europe, extending locally to S. Norway, the Pyrenees and E. Spain; W. Asia; N. Africa.

2. *C. valentina* L.

Plate XXI

Shrubby Crown Vetch

Small shrub up to 100 cm high. Leaflets 2-6 pairs, up to 20 mm long, obovate, emarginate; stipules free, deciduous. Heads 4-to 12-flowered. Corolla 7-12 mm, long, yellow. Legume 10-50 mm long; segments 1-10, 5-7 mm long, fusiform, subcompressed, with 2 obtuse angles. Fl. 2-4.

Two subspecies are recorded. Subsp. *valentina* has 3-6 pairs of leaflets; stipules 5-10 mm long, herbaceous; legumes with 3-7 segments. Subsp. *glauca* (L.) Batt. has 2-3 pairs of leaflets; stipules 2-6 mm long, ovate or lanceolate, membranous; legume with 1-4 (-10) segments.

Rocky ground. *Malta*: local (G. Lanfranco), as at Wied Babu (S. & C.G.; Borg; Wolseley; Kramer & Westra); Wardija (G.D.; Borg; Wolseley); Ghajn Tuffieha, Gnejna (Borg); Wied Qirda (Gulia; S. & C.G.; Duthie; Borg); Zurleq (Duthie; Borg); Ta' Saliba (I. Evans). *Gozo*: Marsalforn (S. & C.G.; Duthie; Borg).

Mediterranean region.

3. *C. scorpioides* (L.) Koch

Xeht Linhabba, Morra
Yellow Crown Vetch

Annual up to 40 cm high. Leaves simple or trifoliate; terminal leaflet up to 40 mm long, elliptical or suborbicular, much larger than the reniform-orbicular lateral leaflets; stipules 1-2 mm long, connate, membranous. Heads 2-to 5-flowered. Corolla 4-8 mm long, yellow. Legume 20-60 mm long, curved; segments 2-11, oblong, more or less straight, obtusely 4- or 6-angled. $2n = 12$. Fl. 3-5.

In fields among crops, rocky and waste land, and in valleys. *Malta*, *Gozo*, *Comino* and *Cominotto*: frequent everywhere (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region; W. Asia.

26. *Hippocrepis* L.

Annual or perennial herbs. Leaves imparipinnate; stipules small, linear or lanceolate, free. Flowers in axillary heads, rarely solitary. Calyx tubular-campanulate, with 5 subequal teeth; corolla yellow; keel acute; stamens diadelphous. Legume lomentaceous, laterally compressed; segments lunate to horseshoe-shaped, or flat and rectangular with a semi-circular to orbicular sinus which has a curved protuberance at its base enclosing the seed.

1. Peduncles not more than 5 mm long, usually 1-flowered
Peduncles more than 5 mm long, with 2 or more flowers

3. *unisiliquosa*

2.

2. Corolla 3-5 mm long; legume with long papillae on the seed protuberance
Corolla 5-8 mm long; legume glabrous or with very small papillae

1. *ciliata*2. *multisiliquosa*1. *H. ciliata* Willd.

Lesser Horseshoe-Vetch

Slender annual up to 30 cm high. Leaflets 3-6(-7) pairs, 5-15 x 0.5-3 mm, linear or oblong. Heads 2- to 6-flowered; peduncle about equalling the leaves. Corolla 3-5 mm long. Legume 15-25 x 2.5-4 mm, curved so that the sinuses open on the convex edge; segments with orbicular sinuses and with long papillae on the seed protuberance. Fl. 3-5.

Arid, rocky places. *Malta*: Buskett, St. Paul's Bay, Mellicha, Wied il-Ghasel (Borg). *Gozo*: Wied Bingemma, Wied ir-Rihan (Borg). *Comino* (S. & C.G.; Borg).

Mediterranean region.

2. *H. multisiliquosa* L.

Plate XXI

Cintilli
Xintilli.

Slender annual 10-60 cm high. Leaflets 3-8 pairs, 5-15 x 2-5 mm, obovate-oblong. Inflorescence 2- to 6-flowered; peduncle about equalling leaves. Corolla

5-8 mm long. Legume 20-40 (-60) x 3-5 mm, curved so that the sinuses open on the convex edge; segments with orbicular sinuses, glabrous or very sparsely papillose. $2n = 14$. Fl. 3-5.

Among growing crops, field margins, in valleys and uncultivated land.

Malta, Gozo and Comino: common (Borg; G. Lanfranco; Wolseley).

Mediterranean region.

3. *H. unisiliquosa* L.

Xintilla, Cintilli
Single-flowered Horseshoe-Vetch

Slender annual up to 40 cm high. Leaflets 3-7 pairs, 2-12 x 1-5 mm, linear to obovate. Flowers usually solitary, axillary, sometimes 2 or 3 together and shortly pedunculate. Corolla 4-7 mm long. Legume 15-40 x 4-5 mm; segments with an orbicular sinus, glabrous or sparsely papillose. Fl. 3-5.

Field margins and uncultivated land. Malta, Gozo and Comino: very common everywhere (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region.

27. *Scorpiurus* L.

Annual. Leaves simple, with 3-5 parallel veins; stipules free, linear. Flowers solitary or in axillary heads. Calyx campanulate, with 5 equal teeth; corolla yellow or purplish; keel acute, stamens diadelphous. Legumes lomentose or indehiscent; curved or variously contorted, longitudinally ridged, usually with spines or tubercles on the other ridges.

Fruit smooth or with tubercles or spines on the outer ridges; flowers usually 2-5 in a head

1. *muricatus*

Fruit with capitate tubercles on the outer ridges; flowers solitary, rarely 2 together on a peduncle

2. *vernuculatus*

1. *S. muricatus* L.
S. subvillosus L.

Plate XXI

Widna
Many-flowered Scorpiurus

Stems up to 80 cm high, glabrous or pubescent with appressed or with patent hairs. Head (1-) 2- to 5-flowered. Corolla 5-10 (-12) mm long. Legume with the ridges smooth or the outer 4-8 tuberculate or spinose. Seeds lunate, attenuate at ends. $2n = 28$. Fl. 3-5.

Fields, valleys, rocky and waste ground, native and often cultivated as a forage plant. Malta, Gozo and Comino: common everywhere (S. & C.G.; Borg; G. Lanfranco; Wolseley). Cominotto: (Duthie; Borg).

Mediterranean region.

2. *S. vernuculatus* L.

Single-flowered Scorpiurus

Stems up to 70 cm high, hirsute. Flowers solitary or rarely 2 together on a peduncle. Corolla 10-20 mm long. Legume with stout capitate tubercles on the outer ridges. Seeds elliptical or oblong. Fl. 3-4.

Malta: Wied Balluta (GD.); Borg; Cottonera (Gulia; Borg).

W. Mediterranean region.

28. *Hedysarum* L.

Annual or perennial herbs. Leaves imparipinnate; stipules free or connate. Flowers in axillary racemes. Calyx campanulate, with 5 subequal teeth; corolla pink, purple or violet, rarely white or yellow; stamens diadelphous. Legume lomentaceous, more or less compressed, with up to 8 segments. Seeds 1 in each segment.

1. Perennial, 30-100 cm high; legume glabrous
Annual, 15-35 cm high; legume pubescent

1. *coronarum*

2.

2. Corolla 8-11 mm long, 1½-2 times as long as the calyx.

2. *spinosissimum*

Corolla 4-20 mm long, 2½-5 times as long as the calyx.

3. *glomeratum*

1. *H. coronarium* L.

Silla
Sulla

Perennial 30-100 cm high, sparsely-appressed pubescent. Leaflets 3-5 pairs, 15-35 x 12-18 mm, elliptical to obovate-orbicular, glabrous or subglabrous above, pubescent beneath. Racemes 10- to 35-flowered, dense. Calyx sparsely to densely pubescent, the teeth about as long as the tube; corolla 12-15 mm long, bright reddish-purple. Legume with 2-4, spinulose, but otherwise glabrous segments. $2n = 16$. Fl. 3-5.

Extensively cultivated as a forage plant. Malta, Gozo and Comino: very common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

C. & W. Mediterranean region.

2. *H. spinosissimum* L.

Silla salvagga
Spiny Sulla

Annual 15-35 cm high, appressed-pubescent. Leaflets (2-) 4-8 pairs, 5-12 x 1-5 mm, elliptical or oblong, subglabrous or pubescent. Racemes 2- to 10-flowered. Calyx 4-6 mm long, sparsely pubescent, the teeth as long as or longer than the tube; corolla 8-11 mm long, white to pale pinkish-purple, 1½-2 times as long as the calyx. Legume with 2-4 spinulose and pubescent segments. Fl. 3-5.

Arid, rocky ground. Malta: locally abundant at Marfa (Wolseley); Ahrax, Ghajn Tuffieha (Borg); Ghadira (Borg; Kramer & Westra); Qalet Marku (Gauci). Comino: abundant on the central highland (Borg; Wolseley).

Mediterranean region.

2. *H. glomeratum* F.G. Dietrich Plate XXI
H. capitatum Desf., non Burm. fil.

Silla salvagga
Clustered Sulla

Differs from *H. spinosissimum* as follows: leaflets sometimes obovate; corolla 14-20 mm long, pinkish purple, 2½-5 times as long as the calyx. Fl. 3-5.

Arid, rocky places near the sea. Malta: locally abundant as at Marfa peninsula, Marsaxlokk, Delimara, Gnejna (S. & C.G.; Borg; Wolseley); Mellieha (Duthie; S. & C.G.; Borg; Wolseley); Ghajn Tuffieha (Borg). Gozo: Xlendi near the sea (Duthie; S. & C.G.; Ta' Ċenè (Wolseley).

GERANIALES

XXXVIII. OXALIDACEAE

Herbs, rarely small shrubs. Leaves usually compound. Flowers 5-merous, hermaphrodite, actinomorphic. Ovary superior, 5-locular; placentation axile. Fruit a capsule. Seeds with endosperm.

1. *Oxalis* L.

Perennial herb, sometimes bulbous. Leaves palmately 3 (-8)-foliate, with or without stipules; leaflets usually indented at the apex, otherwise entire, showing sleep-movements. Inflorescence axillary, cymose, sometimes a cymose umbel or a single flower. Flowers often heterostylous. Sepals 5, free; petals 5, free, or weakly united. Stamens 10, obdiplostemonous. Ovules numerous. Styles 5, free. Fruit a loculicidal capsule. Seeds projectile, with an elastic integument.

1. Flowers purplish or pink
Flowers yellow
2. Aerial stem present; bulbils absent
Aerial stem absent; bulbils present at base of plant

3. *purpurea*

2

1. *corniculata*
2. *pes-caprae*

Yellow Oxalis

1. *O. corniculata* L.

Creeping, pubescent perennial, but flowering soon after germination. Stems up to 50 cm high, procumbent, rooting at the nodes. Leaves alternate; petioles 2-8 cm long, with small auriculate stipules; leaflets 5-18 x 8-23 mm, obcordate, deeply emarginate. Inflorescence umbellate, of 1-7 flowers; fruiting pedicels deflexed. Sepals lanceolate; petals 4-7 mm long, yellow. Capsule 10-25 mm long, cylindrical, hoary. Seeds transversely ridged, brown. $2n = 24$. Fl. 3-11.

Cultivated and waste places, and on walls. Malta: frequent (S. & C.G.; Borg; G. Lanfranco). Gozo: frequent (Borg).

Tropical and warmer temperate regions of the world.

2. *O. pes-caprae* L. *O. cernua* Thunb.

Plate XXI

Qares, Haxixa Ingliza
African Oxalis

Sparsely pubescent, caespitose perennial, with a deeply-buried bulb, which emits an annual, ascending, subterranean stem bearing bulbils and a rosette of leaves at soil level. Petioles up to 20 cm long; leaflets 8-20 x 12-30 mm, obcordate, deeply emarginate. Flowers infundibuliform (sometimes *flore pleno*) in umbellate cymes; petals 5, frequently 10, 20-25 mm long, yellow. Capsule short, rarely formed. Fl. 11-5.

Introduced in 1811; now well established in cultivated and waste places. Malta, Gozo and Comino: abundant everywhere (S. & C.G.; Borg; G. Lanfranco; Haslam; Wolseley).

Native of S. Africa; extensively naturalised in Mediterranean region and W. Europe.

3. *O. purpurea* L. *O. humilis* Thunb.

Pubescent or villous caespitose perennial, with a bulb which emits an ascending subterranean stem bearing a rosette of leaves at soil level. Petioles 3-10 long; leaflets 8-23 x 9-30 mm, rhombic, obtuse, punctate and often purple beneath. Flowers solitary, infundibuliform; peduncles 1-10 cm; sepals lanceolate; petals 25-35 mm long, purplish-pink, white at base. Capsule c. 5 mm. long. Garden escape (Borg; Wolseley).

Native of S. Africa, naturalised in S.W. Europe.

XXXIX. GERANIACEAE

Herbs, or rarely small shrubs with soft stems. Leaves stipulate, usually lobed or divided, and sometimes more or less compound. Flowers in cymes, umbels or spikes. 5-merous, actinomorphic or somewhat zygomorphic. Sepals 5, free; petals 5, free; stamens obdiplostemonous in two whorls of 5, some of them sometimes reduced to staminodes. Ovary superior, of 5 united carpels, separating in fruit into 5 1-seeded mericarps; styles united in flower, sometimes separating in fruit.

Several species and hybrids of 'gardeners' Geranium', *Pelargonium*, from S. Africa are commonly cultivated for ornament and occasionally escape and persist on walls.

Leaves palmately (rarely ternately) divided or lobed; beak of mericarp straight or curved in a simple arc, sometimes absent

1. *Geranium*

Leaves pinnately divided or lobed; beak of mericarp spirally twisted at maturity

2. *Erodium*

1. *Geranium* L.

Herbs. Leaves more or less orbicular in outline, palmately (rarely ternately) lobed or divided, many or all of them basal; cauline leaves, if present, usually opposite near base of stem, but often alternate in the inflorescence. Inflorescence cymose; ultimate peduncles usually 2-flowered. Flowers actinomorphic. All stamens fertile. Stigmas 5, filiform. Mericarps usually dehiscent, separating from the base upwards, usually retaining outer part of style in the form of a long beak, of which the apex remains for a while attached to the central axis formed by the still coherent inner parts of all 5 styles.

In all species, except where the contrary is implied in the description, the basal leaves (to which the descriptions refer) have long petioles; the cauline leaves, if present, have progressively shorter petioles and lamina often with fewer lobes; all leaves bear rather short appressed hairs on both surfaces; and the sepals are hairy, obtuse to subacute, and mucronate or aristate.

In the description below *lobe* is used to indicate a primary division of the leaf, *segment* a division of a lobe. Measurements of sepals refer to the fruiting condition and include the arista.

1. Petals with conspicuous claw; sepals erect during flowering
2. Petals without distinct claw; sepals more or less patent during flowering
- 4.

2. Sepals keeled; leaves not deeply divided
Sepals not keeled; leaves very deeply divided so
as to appear compound

3. Petals 9-13 mm long; pollen orange; mericarps
with rather few ridges
Petals 5-9 mm long; pollen yellow; mericarps with
numerous ridges

4. Petals entire
Petals 2-lobed, emarginate or crenulate at apex

5. Mericarps (excluding style) glabrous
Mericarps (excluding style) hairy

4. *lucidum*

5. *robertianum*

6. *purpureum*

1. *rotundifolium*

2. *molle*
3. *dissectum*

1. *G. rotundifolium* L.

Round-leaved Crane's-bill

Annual; stems 10-40 cm high, erect or ascending, with long and short hairs, both glandular and eglandular mixed. Basal leaves 3-7.5 cm wide, divided or 25-40% of the radius into 5-7 contiguous, cuneate lobes, which are deeply crenate or divided apically into short obtuse segments; upper leaves more deeply divided with more acute segments. Peduncles usually shorter than subtending leaves. Sepals 5-6 mm long, mucronate; petals 5-7 mm long, entire or very slightly emarginate, pink. Mericarps hairy, without ridges. $2n = 26$. Fl. 2-4.

Fields, valleys and waste places. *Malta*: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Gozo*: common (S. & C.G.; Borg; Wolseley).

Most of Europe except the north; W. and C. Asia; N. Africa; Atlantic Islands, introduced elsewhere.

2. *G. molle* L.

Plate XXI

Dovesfoot Crane's-bill

Densely pubescent, usually greyish-green annual, perhaps rarely perennial, stems 10-40 cm high, decumbent or ascending, branched from the base, with long, soft white hairs and shorter, often glandular hairs. Basal leaves 1.5-4 cm wide, divided for 70% of the radius into 5-7 obovate-cuneate, shortly 3-fid lobes; uppermost leaves alternate, sessile; lowest leaves of inflorescence considerably exceeding subtending peduncle and with petiole considerably longer than lamina. Sepals 4-5 mm long, shortly mucronate; petals 3-11 mm long, deeply emarginate, pinkish purple. Filaments glabrous. Mericarps glabrous, usually with transverse ridges. Fl. 2-4.

Waste places and road margins. *Malta* and *Gozo*: very common (S. & C.G.; Borg; Lanfranco; Wolseley). *Comino* (S. & C.G.; Borg).

Europe except the extreme north; Asia; N. Africa; Atlantic Islands.

3. *G. dissectum* L.

Cut-leaved Crane's-bill

Annual; stems 10-60 cm high, ascending or erect, usually with short deflexed hairs. Leaves 2-5 cm wide, divided almost to the base into 5-7 contiguous, rhombic, deeply pinnatifid lobes; segments linear-oblong; uppermost leaves opposite, distinctly petiolate. Peduncles shorter than the subtending leaves; pedicels and sepals densely pubescent with some of the hairs glandular; sepals 5-6 mm long, with short aristate. Petals c. 5 mm long, purplish-pink. Mericarps hairy, without ridges. $2n = 22$. Fl. 2-4.

Valleys, gardens and shaded places. *Malta* and *Gozo*: frequent (Borg; G. Lanfranco; Wolseley; Haslam).

Most of Europe; S.W. Asia; N. Africa, Atlantic Islands, introduced elsewhere.

4. *G. lucidum* L.

Shining Crane's-bill

Annual, shining green, often tinged with red, usually sparsely hairy. Stems 10-40 cm high, erect or ascending. Leaves 2-6 cm wide, divided for 65-70% of the radius into 5 obovate-cuneate lobes, which are crenate or shortly 3-fid at the apex, with broad, obtuse, mucronate segments. Sepals 5-7 mm long, aristate, erect and connivent during flowering, strongly keeled and with transverse ridges. Petals 8-10 mm long, with a well-marked claw longer than the obovate, entire, pink limb. Mericarps usually separating without a stylar beak, laterally compressed, with 5 strong longitudinal ridges at apex, irregularly reticulate-fugose below; pubescent on upper and inner sides. $2n = 20$. Fl. 2-5.

Old walls, waste places and fields. *Malta* and *Gozo*: (Gulia, without locality); Buskett, Wied Gerzuma (Borg).

Most of Europe except the north-east; S.W. Asia; N. Africa; Madeira.

5. *G. robertianum* L.

Herb Robert

Annual or biennial, often turning red, more or less hairy. Stems 10-50 cm high, procumbent or ascending. Leaves 3-8 cm wide, very deeply divided so as to appear compound, with 3(-5) principal divisions which are 2-pinnatifid with oblong, mucronate or apiculate segments. Pedicels with long, patent, glandular and deflexed eglandular hairs. Sepals 7-9 mm long, erect, lanceolate, aristate, hirsute with stout hairs. Petals 9-13 (-15) mm long; limb 6-9 mm long, obovate-cuneate, entire, bright pink, abruptly contracted to a narrow claw. Pollen orange. Mericarps separating without stylar beak, but remaining attached to the axis by a strand of delicate fibres; with 1 or 2 strong transverse ridges at the apex and a few, low, irregular ridges forming an open reticulum elsewhere; ridges usually hairy. $2n = 32, 64$. Fl. 2-5.

Valleys and shady places. *Malta*: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Gozo*: frequent (S. & C.G.; Borg; Wolseley). *Comino* (Borg).

Most of Europe except the extreme north; Asia; N. Africa; Atlantic Islands.

6. *G. purpureum* Vill.

Purple Herb-Robert

Diggers from *G. robertianum* in having sepals ovate, mucronate or shortly aristate; petals 5-9 mm long, purplish-pink, with limb 3-5 mm long, elliptic-oblong, longer than broad, and contracted less abruptly to a relatively broader claw; pollen yellow; mericarps usually glabrous with about 4 strong, transverse ridges near the apex, and covered elsewhere by a close reticulum of lower but conspicuous ridges. $2n = 32$. Fl. 2-5.

Valleys and shady places: *Malta*: Buskett, Wied Incita (Borg).

S. & W. Europe, northwards to c. 52°N.; Atlantic Islands.

2. *Erodium* L'Hér.

Annual to perennial herbs, usually with hermaphrodite flowers; rarely dioecious. Leaves mostly opposite, usually longer than wide, pinnatifid to pinnate, or rarely undivided, usually with appressed hairs. Inflorescence an umbel (rarely reduced

to a single flower), subtended by 2 or more usually scarious bracts. Flowers actinomorphic or slightly zygomorphic. Stamens 5, antesealous, with a nectary at the base of the filament, alternating with 5 scale-like staminodes. Mericarps indehiscent, separating from the base upwards, retaining during dispersal the outer part of the style as long beak, which in most species becomes twisted into a spiral at maturity, the pitch of the spiral varying with the humidity. Stigmas 5, filiform.

In some species the principal lobes of the leaf alternate irregularly with very much smaller lobes or leaflets. The latter are referred to as *intercalary lobes* or *leaflets*.

The sepals of most species are accrescent. The measurements below refer to the fruiting condition, and include the mucro or arista.

At the top of the mericarp, near the base of the style, are two flattened areas or depressions, referred to below as *pits*, which are in some species divided into two or more sections by one or more ridges. As the ridges lie near the lower margin of the pit, the impression created is of a pit with one or more *furrows* below it, and this terminology is used in the descriptions.

1. Leaves undivided, pinnatifid or pinnatisect, sometimes compound at the base, but if so with only 1(2) pairs of distinct leaflets
Leaves pinnate for most of their length (sometimes pinnatisect towards the apex)
2. Bracts at base of umbel 2
Bracts at base of umbel at least 3
3. Beak of fruit 18-40 mm long
Beak of fruit more than 45 mm long
4. Apical pits of mericarp without a furrow at the base
Apical pits of mericarp with a furrow at the base
5. Petals c. 15 mm long, apical pits of mericarp with two conspicuous furrows at the base
Petals c. 8 mm long, apical pits of mericarp without furrows at the base
6. Intercalary leaflets present, much smaller than the principal ones
Intercalary leaflets absent
7. Plant caulescent
Plant acaulescent
8. Most of the leaflets divided more than half-way to the mid-rib; apical pits of mericarp eglandular
Most of the leaflets divided less than half-way to the mid-rib; apical pits of mericarp glandular
9. Annual or biennial
Perennial

2. *laciniatum*

1. *chium*
3. *malacoides*

4. *botrys*

5. *ciconium*

5. *ciconium*

6. *cicutarium*

7. *moschatum*

6. *cicutarium*
8. *acaule*

1. *E. chium* (L.) Willd.

Mediterranean Stork's-bill

Stems 5-50 cm high, with deflexed hairs, at least near the base. Leaves ovate, very variably dissected. Umbels with 2-8 flowers; bracts 3 or more, ovate, acute, brown. Sepals 5-7 mm long; petals 5-9 mm long; purplish. Mericarps 3.5-4.5 mm long, with short, appressed, whitish hairs; apical pits small but rather deep, covered with minute glands, without a furrow at the base. Beak 30-40 mm long. $2n = 20$. Fl. 2-3.

Fields and waste places. *Malta*: Wied Chonior (GD); Mtahleb, Wied Inčita (Gulia; Borg); Mellieħa (Duthie; Borg); Ghajn Tuffieħa (Borg).

Mediterranean region; W. Asia; Atlantic Islands.

2. *E. laciniatum* (Cav.) Willd.

Cut-leaved Stork's-bill

E. chium var. *laciniatum* (Cav.) Fiori

Annual or biennial, stems 10-70 cm high, with deflexed hairs at least near the base. Leaves 2-7 cm long, oblong to broadly ovate, very variably dissected; undivided and irregularly serrate, or with 3 pinnatifid lobes, or almost bipinnatisect with linear-lanceolate segments. Umbels with 4-9 flowers; bracts 2, suborbicular to reniform, glabrous, brown; hairs on pedicels and sepals eglandular. Sepals c. 7 mm long, distinctly mucronate; petals c. 7 mm long, purplish. Mericarps 4.5-6.5 mm long, with short, whitish hairs; apical pits shallow, eglandular, without a furrow at the base. Beak 35-90 mm long. $2n = 20$. Fl. 4-6.

Sandy places. *Malta*: rare (G. Lanfranco) as at Marfa, Ghadira (S. & C.G.; Duthie; Borg); St. Paul's Bay, Baħar ič-Cagħaq (Borg). *Gozo*: Xlendi (S. & C.G.; Borg); Ramla (Duthie; Borg); Qbajjar (Borg).

Mediterranean region.

3. *E. malacoides* (L.) L'Hér.

Plate XXI

E. subtrilobum Jordan

Glandular Stork's-bill

Annual or biennial; stems 3-50 cm long, with deflexed hairs, often glandular. Leaves 2-10 x 1-5 cm, ovate to oblong, cordate, dentate, sometimes pinnatifid. Umbels with 3-7 flowers; bracts several, ovate-orbicular, often hairy, whitish; hairs on pedicels and sepals usually glandular. Sepals 5-7 mm long, petals 5-9 mm long, purplish. Mericarps 4-5 mm long, with white or brownish hairs; apical pits deep, usually glandular, with a wide, deep furrow at the base. Beak 18-35 mm long. $2n = 40$. Fl. 1-4.

Fields, valleys and waste places. *Malta*, *Gozo*, *Comino* and *Cominotto*: very common (Borg; G. Lanfranco; Wolseley).

Mediterranean region, extending northwards in W. France to 49°N.

4. *E. botrys* (Cav.) Bertol.

Hairy Stork's-bill

Caulescent annual; stems 5-40 cm high, with long, patent or deflexed hairs. Leaves up to 5 cm long, usually appressed-setose, oblong or ovate, at least the upper deeply pinnatifid or pinnatisect; lobes pinnatifid or dentate. Umbels with 1-4 flowers; bracts ovate-lanceolate, acute, subglabrous, brown. Sepals 10-13 mm long; petals c. 15 mm long, violet. Mericarps 8-11 mm long, with ascending, whitish hairs; apical pits deep, eglandular, with two furrows at the base, the upper larger. Beak 80-110 mm long.

Gozo: two plants on Ta' Harrax in April 1859 (Gulia).

Mediterranean region.

5. *E. cicutum* (L.) L'Hér.

Sand Stork's-bill

Annual or biennial, stem 10-70 cm high with short, usually deflexed and glandular hairs. Leaves up to 9 cm long, pinnate at least near the base; leaflets pinnatisect, the ultimate segments dentate or pinnatifid; intercalary lobes present. Umbels with 3-10 flowers; bracts ovate-lanceolate, densely hairy. Sepals 12-15 mm long, glandular-hairy; petals c. 8 mm long, bluish or lilac, with darker veins. Mericarps 9-11 mm long, with numerous whitish hairs; apical pits deep, densely glandular, without a furrow at the base. Beak 60-100 mm long. $2n = 18$. Fl. 3-4.

Grassy places. *Malta*: Wied Balluta, Kordin, (GD.; Borg).

Mediterranean region, extending northwards to 48°N. in E. C. Europe; W. Asia.

6. *E. cicutarium* (L.) L'Hér.

Common Stork's-bill

Usually caulescent and annual, often somewhat foetid; stems up to 60(-100) cm high. Leaves up to 15 cm long, pinnate, with variable indumentum, without intercalary leaflets; leaflets pinnatifid to pinnate, but always divided for more than half-way to midrib. Umbels with up to 12 flowers; bracts brownish. Sepals 5-7 mm long; petals 4-11 mm long, purple, lilac or white. Mericarps 4-7 mm long, with ascending hairs; apical pits eglandular. Beak 10-70 mm long. Fl. 11-5.

Road margins and waste places. *Malta*, Gozo and Comino; very common (Borg; G. Lanfranco; Wolseley).

Throughout Europe; temperate Asia; N. Africa; Atlantic Islands; introduced elsewhere.

7. *E. moschatum* (L.) L'Hér.

Haxixa tal-misk
Musk Stork's-bill

Annual or biennial, smelling of musk. Stems 10-50 cm high, hispid with usually deflexed hairs, dense above, sparse below. Leaves up to 20 cm long, oblong-lanceolate, pinnate almost throughout their length, without intercalary leaflets; leaflets ovate, dentate-serrate or somewhat pinnatifid, the lower ones remote. Stipules brown. Umbels with 5-12 flowers; bracts several, broadly ovate, subacute, subglabrous, pale brown. Sepals 6-9 mm long; petals c. 15 mm long, violet or purple. Mericarps 5-6 mm long, with patent, brown or white hairs; apical pits very wide, glandular, with a wide, deep furrow at the base. Beak 20-45 mm long. Fl. 12-5.

Fields, waste places and road margins. *Malta*, Gozo and Comino; very common (Borg; G. Lanfranco; Wolseley).

Mediterranean region; W. Europe; Atlantic Islands; introduced elsewhere.

8. *E. acaule* (L.) Becherer & Thell.

Stemless Stork's-bill

E. romanum (Burm. fil.) L'Hér.

Acaulescent perennial. Leaves up to 15 cm long, oblong to ovate-lanceolate, pinnate without intercalary leaflets; leaflets ovate-elliptical to ovate-lanceolate, pinnatifid or pinnatisect, ultimate segments of leaves elliptic-lanceolate; petiole

very short, sparsely eglandular-pubescent. Umbels with 3-10 flowers; peduncles eglandular below; bracts several, ovate-lanceolate, subglabrous, brown. Sepals 5-8 mm long, with appressed eglandular hairs. Petals 7-12 mm long, lilac, equal, without black patch. Mericarps 6-7 mm long with ascending white hairs; apical pits eglandular, with a fairly distinct furrow at the base. $2n = 40$.

Malta: rare, mentioned in Webb's herbarium (Borg).

Mediterranean region.

XL. TROPAEOLACEAE

Flowers solitary, axillary, hypogynous, zygomorphic, hermaphrodite. Sepals 5, the dorsal produced into a spur; petals 5, clawed; stamens 8, free, unequal; ovary 3-locular, each loculus with 1 pendulous ovule; placentation axile; style 1, apical; stigmas 3, linear. Fruit of 3 indehiscent, 1-seeded carpels, which separate from the central axis when mature.

1. *Tropaeolum* L.

Somewhat succulent herbs, procumbent or climbing by coiling petioles; leaves alternate; stipules usually absent.

1. *T. majus* L.

Garden Nasturtium

Glabrous annual or perennial. Leaves 4-15 cm long, peltate, orbicular, subentire to somewhat angular or sinuate. Flowers 3-6 cm in diameter, orange or red to yellow, or parti-coloured; spur 2-4 cm long, straight, cylindrical; limb of petals orbicular, more or less equalling claw; 3 lower petals ciliate at base.

Widely cultivated. *Malta*: naturalised on waste ground at Salini and elsewhere (Haslam).

Native from Peru to Columbia; widely cultivated in gardens for ornament.

XLI. ZYGOPHYLLACEAE

Herbs or shrubs. Leaves stipulate, usually pinnate. Flowers hermaphrodite, usually actinomorphic, (4-)5-merous. Disk present. Stamens usually twice as many as petals. Ovary superior, usually angled or winged. Fruit dry or fleshy.

Flowers purple; stipules spinose

1. *Fagonia*

Flowers yellow; stipules not spinose

2. *Tribulus*

1. *Fagonia* L.

Herbs; often with spinose stipules. Sepals 5, deciduous; petals 5, clawed, caducous. Disk inconspicuous; stamens 10. Ovary 5 angled. Fruit a capsule; seeds with endosperm.

1. *F. cretica* L.

Plate XXII

Fagonia

Almost glabrous, procumbent perennial 10-40 cm high. Stems branched, angled and striate. Leaves opposite, trifoliate, petiolate; leaflets 5-15 mm long, lanceolate or linear-lanceolate, asymmetrical, rather coriaceous; stipules shorter than petioles, spinose. Flowers c. 10 mm in diameter, solitary, axillary. Sepals acuminate; petals purplish. Fruit 8-10 mm long, (including the persistent style), the 5 loculi very sharply angled and ciliate on the angles. Fl. 3-5.

Rocky ground. *Malta*: rare (G. Lanfranco), as at Gnejna on the hillside (Borg; Wolseley); Fomm ir-Rih (GD); Borg); Ghajn Tuffieha (Kramer & Westra); Ar gotti (Wolseley).

Mediterranean region.

2. *Tribulus* L.

Herbs. Sepals 5, deciduous; petals 5, fugacious. Disk annular, 10-lobed; stamens 10. Ovary 5-lobed. Fruit splitting into 5 indehiscent portions; seeds without endosperm.

1. *T. terrestris* L.

Plate XXII

Ghatba Salib 1-art
Tribulus

Pubescent, prostrate annual 10-60 cm long. Stems simple or freely branched. Leaves opposite, often unequal, paripinnate; pinnae 5-8 pairs, elliptical or oblong lanceolate. Flowers 4-5 mm long; petals yellow. Fruit of 5, stellately arranged, hard, rugose carpels which are keeled and tuberculate on the back with 2 or more stout spines on the sides. Fl. 6-11.

Stony waste places. *Malta*: rather rare. Floriana (Borg; Delia; Wolseley); Kalkara, Marsa, along the railway from Birkirkara to Attard (S. & C.G.; Borg); Ghadira (G. Lanfranco); Zebbug road (Gauci). *Gozo*: Ramla (S. & C.G. Borg).

Mediterranean regions extending locally northwards to N.W. France, S.E. Czechoslovakia and E.C. Russia; Asia; Africa; introduced elsewhere.

XXII. LINACEAE

Herbs or small shrubs. Leaves exstipulate, simple, entire. Inflorescence cymose. Flowers 4- or 5-merous, actinomorphic. Sepals free; petals usually free (sometimes joined at base); fertile stamens in one whorl, sometimes with a whorl of staminodes. Ovary superior, usually 8- or 10-celled. Styles usually free. Fruit a loculicidal capsule; seeds usually 1 in each loculus.

1. *Linum* L.

Herbs or small shrubs. Leaves sessile, usually narrow, 1-veined or parallel-veined. Flowers 5-merous. Sepals entire. Petals clawed, longer than the sepals. Stamens 5, alternating with 5 tooth-like staminodes; filaments united at base. Capsule dehiscent with 10 valves, often with a short beak. Seeds flat.

1. Capsule less than 3.5 mm in diameter; petals yellow
- Capsule more than 3.5 mm in diameter; petals blue, pink or red

2. Leaves 1-2(-3) mm wide, with smooth margins
- Leaves 1.5-3(-5) mm wide, with minutely serrulate margins, often inrolled

3. Petals pink or red; sepals 7-9 mm long
- Petals blue; sepals 4-5.5 mm long

1. *L. decumbens* Desf.

3. *trigynum*

4. *strictum*

1. *decumbens*

2. *bienne*

Kittien

Ascending Flax

Glabrous annual; stems up to 40 cm high, decumbent, ascending or suberect. Leaves 1-3(-5) mm wide, linear or linear-lanceolate, acute, 1-to 3(-5) veined,

usually with scabrid margins. Sepals 7-9 mm long, ovate, long-acuminate, with wide, scarious margins below and narrow, ciliate margins above. Petals 2-2½ times as long as the sepals, pink or red. Stigmas linear. Capsule 4.5-6.5 mm in diameter, subglobose; beak 0.5-1 mm long, acuminate. Homostylous. Fl. 4-5.

Sea shore. *Malta*: Ghajn Zejtuna near Mellicha (S. & C.G.; Borg).

S. Italy; Sardegna; Sicilia; N. Africa.

2. *L. bienne* Miller

L. angustifolium Hudson

Kittien

Pale Flax

Biennial or perennial (rarely annual); stems 6-60 cm high, usually branched, slender; ascending or erect. Leaves 0.5-1.5 mm wide, linear or linear-lanceolate, acuminate, 1-to 3-veined. Sepals 4-5.5 mm long, subequal, ovate-acuminate, with a conspicuous mid-vein; margin of inner sepals scarious and ciliate, margin of outer sepals entire. Petals 2-3 times as long as sepals, blue. Stigmas linear. Capsule 4-6 mm in diameter, subglobose; beak c. 1 mm long, acuminate. Homostylous, 2n = 30. Fl. 4-5.

Sandy sea-shores and inland. *Malta*: rare (G. Lanfranco), as at Ramla tal Qortin, Marfa (S. & C.G.; Borg); Selmun (Duthie; S. & C.G.; Borg); Wied Incita (Penza). *Comino*: Ramla Sta. Marija (Gauci).

Mediterranean region; W. Europe; Atlantic Islands.

3. *L. trigynum* L.

Plate XXII

Southern Flax

L. gallicum L.

Glabrous annual; stems 10-30 cm high, erect or ascending. Leaves 1-2(-3) mm wide, linear-lanceolate to narrowly elliptical, with smooth margins. Sepals 3-4 mm long, shortly acuminate with glandular-ciliate margins and setaceous apex. Petals 4-6 mm long, yellow. Stigmas linear. Capsule c. 2 mm long, subglobose; beak c. 0.3 mm. Homostylous. Fl. 3-5.

Arid, rocky ground. *Malta*, *Gozo* and *Comino*: Frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Comino* (Duthie).

Mediterranean region extending northwards to C. France and E. Czechoslovakia; W. Asia; Atlantic Islands.

4. *L. strictum* L.

Kittien tal-imharbat

Upright Flax

Annual; stems 10-45 cm high, erect, inconspicuously hairy below. Leaves 1.5-3 (-5) mm wide; margins minutely serrulate, very rough, often inrolled. Sepals 4-6 mm long, ovate-lanceolate, long-acuminate, minutely serrulate and glandular-ciliate. Petals 6-12 mm long, yellow. Stigmas capitate. Capsule 2-2.5 mm in diameter, subglobose; beak c. 0.3 mm long. Homostylous. 2n = 18. Fl. 3-5.

It is possible that two subspecies occur. Subsp. *strictum* has the stems robust, seldom branched below; inflorescence a dense, spike-like cyme or corymb; flowers sessile or subsessile with thick pedicels rarely longer than the calyx. Subsp. *corymbosum* (Reichenb.) Rouy has the stems slender, often branched below; inflorescence lax, spreading; pedicels slender, equalling or longer than the calyx.

Uncultivated fields, rocky and arid places. *Malta*: frequent (S. & C.G.; Borg; G.

Lanfranco; Wolsley; Kramer & Westra). Gozo and Comino (S. & C.G.; Borg; Wolsley). Cominotto (Duthie; S. & C.G.; Borg).

Mediterranean region; W. Asia; Atlantic Islands.

XLIII. EUPHORBIACEAE

Dioecious or monoecious herbs or shrubs, often with latex. Leaves usually alternate, simple; usually stipulate. Flowers usually actinomorphic, often apetalous and sometimes without sepals. Male flowers with one to many stamens with free or connate filaments. Female flowers, with a usually 3-locular superior ovary and 3 styles; disc usually present, annular, pulvinate or cyathiform; ovules 1-2 in each loculus. Fruits a capsule often dehiscing explosively; seeds often carunculate.

1. Inflorescence usually umbellate; flowers without perianth, in small groups surrounded by an involucre; latex present
- Inflorescence not umbellate; perianth present; flowers not surrounded by a involucre; latex absent

2. Plant with stellate hairs
- Plant glabrous or with simple hairs

3. Shrubs; leaves palmately lobed
- Herbs, sometimes woody at base; leaves entire

4. Leaves alternate
- Leaves opposite

5. Euphorbia

2. Chrozophora

4. Ricinus

1. Andrachne
2. Mercurialis

1. Andrachne L.

Monoecious. Small shrubs. Flowers solitary or in small fascicles in the leaf-axils. Sepals 5-6, free or shortly connate; petals 5-6, very small in male flowers. Male flowers with 5-6 stamens, free or connate round the rudimentary ovary; glands between the petals and stamens, free or connate, round the rudimentary ovary; glands between the petals and stamens, free or connate. Female flowers with 3-locular ovary and 3 free or shortly connate styles.

1. A. telephoides L.

Plate XXII

Andrachne

Stems up to 10 cm long, green, simple or little-branched, arising from a brown, much-branched stock. Leaves up to 10 mm long, obovate or elliptical, acute or subacute, entire, glaucous, closely and evenly spaced; petiole 0.5-2 mm long; stipules silvery, often red at base. Petals yellowish. Styles deeply 2-fid. Capsule c. 2 mm in diameter, subglobose, glabrous; seeds triquetrous, with a convex, punctulate back. Fl. 3-8.

Cultivated and waste places. Malta: frequent in the vicinity of urban areas (S. & C.G.; Borg; Wolsley).

Mediterranean region; W. Asia.

2. Chrozophora A. Juss.

Monoecious. Annual herbs, covered with stellate hairs. Male flowers in terminal spike-like racemes or in axillary fascicles; calyx 5-fid; petals 5; stamens 5-10, monadelphous; rudimentary ovary absent. Female flowers solitary at the base

of the male; calyx 10-partite; petals absent or very small; ovary 3-locular; styles 3, 2-fid.

1. C. tinctoria (L.) A. Juss.

Plate XXII

Southern Chrozophora

Plant green or grey-green, rather thinly stellate-tomentose. Stems up to 50 cm high, more or less branched. Leaves ovate or rhombic, entire or sinuate-dentate, subobtusate; cuneate at base; petiole as long as to twice as long as lamina. Capsule mucronate, covered with peltate hairs; seeds c. 4 mm, rough. Fl. 5-10.

Fields and waste ground. Malta and Gozo: frequent (Borg; Wolsley).

Mediterranean region; Asia.

3. Mercurialis L.

Usually dioecious, herbs with watery sap. Leaves opposite, stipules small. Male flowers usually in clusters on long axillary spikes; calyx-lobes 3; stamens 8-15. Female flowers axillary, solitary or in clusters, subsessile or pedunculate; calyx lobes 3; styles 2. Fruit with 2 cells each with 1 seed.

1. M. annua L.

Plate XXII

Burikba

Annual Mercury

Glabrous or sparsely pubescent annual. Stems 10-50 cm high, branched. Leaves 1.5-5 cm long, ovate to elliptic-lanceolate, crenate-serrate, with a petiole 2-15 mm long. Dioecious, rarely monoecious. Female flowers axillary, few, subsessile; calyx-lobes triangular-ovate, acute. Fruit 2-3 x (2-)3-4 mm, hispid, rarely nearly glabrous; seed c. 2 mm in diameter, ovoid, rugulose. $2n = 16, 48, 64, 80, 96, 112$. Fl. 11-5.

Cultivated ground and waste places. Malta, Gozo and Comino; very common (S. & C.G.; Borg; Haslam; Wolsley).

Most of Europe; W. Asia; N. Africa; Atlantic Islands.

4. Ricinus L.

Monoecious shrubs or large herbs. Leaves alternate, deeply palmately lobed. Flowers paniculate, male above, female below. Male flowers with membranous perianth; stamens numerous; filaments repeatedly branched. Female flowers with caducous, membranous perianth; ovary 3-locular. Seeds 3, carunculate.

1. R. communis L.

Plate XXII

Pignu

Castor Oil Tree

Annual herb or shrub up to 4 m high. Leaves up to 60 cm long, peltate, palmately 5- to 9-fid; lobes lanceolate, acuminate; irregularly dentate. Panicle erect. Fruit 10-20 mm in diameter with long conical projections, or smooth. Seed 9-17 in diameter, smooth, shiny, reddish-brown to blackish, marked in various shades of white, grey or brown. Caruncle large. Fl. 3-10.

Cultivated in gardens and naturalised in some valleys. Malta: in the ditches around the fortification of Valletta, St. Andrews (S. & C.G.; Borg; Haslam; Wolsley); Wied Inčita (Wolsley); Wied il-Chasel (Borg; Wolsley).

Native of the Tropics. Widely cultivated for the oil obtained from the seeds, and for ornament.

5. Euphorbia L.

Monococious. Herbs or small shrubs, with latex. Flowers in small groups surrounded by a more or less deeply lobed involucre with 4-6 (rarely more) glands at the top and usually pubescent within, the whole forming a cyathium. In the florescence of cyathia usually umbellate. Perianth absent. Male flowers of a single stamen jointed to the pedicel. Female flowers solitary, pedicellate, surrounded by several male flowers; ovary 3-locular, with 3, usually free styles; ovules solitary in each loculus. Seeds usually carunculate.

In the following account the inflorescence is referred to as an umbel though it is not strictly one. The leaves subtending the primary branches (rays) of the umbel are called ray-leaves. The bracts, when present subtend the individual male flowers in the cyathium.

1. Stipules present; leaves usually asymmetrical at the base, opposite but not decussate
Stipules absent; leaves symmetrical at the base, usually alternate
2. Ripe seeds smooth
Ripe seeds rugulose
3. Capsule glabrous
Capsule hairy
4. Hairs on capsule patent, seeds 1-2 mm in diameter
Hairs on capsule closely appressed, seeds 0.8 mm in diameter
5. Glands suborbicular or ovate, sometimes irregularly lobed, but neither horned nor with the outer margin truncate or emarginate
Glands horned or with a truncate or emarginate outer margin
6. Shrubs with stout branches; glands suborbicular, entire or triangularly lobed
Herbs or slender wiry dwarf shrubs; glands ovate; entire
7. Annual, stems usually solitary
Perennial herbs or small shrubs, stems usually numerous
8. Seeds tuberculate
Seeds smooth
9. Rays of the umbel and dead twigs not persistent
Rays of the umbel and dead twigs persistent
10. Annual; seeds not smooth
Perennial; seeds smooth or not
11. Leaves very dense and closely imbricate.
Leaves not closely imbricate
12. Leaves ovate, suborbicular or obovate, distinctly petiolate
Leaves linear, without distinct petioles

1. *peplis*
2. *chamaesyce*
2. *chamaesyce*
3. *maculata*
4. *deadroides*
8. *helioscopia*
7. *pubescens*
5. *bivonae*
6. *spinosa*
9. *aleppica*
12. *peplus*

13. Seeds vermiculate-rugose
Seeds ovoid-hexagonal with a longitudinal furrow on each face
14. Seeds rugulose or pitted
Seeds smooth
15. 4-7 axillary rays in terminal umbel more widely spaced, axillary rays present but not in whorl below terminal umbel
(6-8-20-27) axillary rays aggregated to form a whorl below umbel and with 0-10 more widely spaced axillary rays
16. 13-30(-40) axillary rays; capsule densely villous
0-9 axillary rays; capsule glabrous
17. Leaves ovate to obovate, succulent, entire and adaxially concave
Leaves linear-lanceolate to elliptic-oblong, minutely serrulate
10. *exigua*
11. *sulcata*
13. *pinca*
14. *biumbellata*
17. *characias*
15. *paralias*
16. *ferracina*

Subgen. *Chamaesyce* Rafin. Usually procumbent annuals. Leaves stipulate, opposite, distichous, usually asymmetrical at base, petiolate. Cyathia axillary or clustered, not in umbels. Glands often with petaloid appendages. Seeds without a caruncle

1. *E. peplis* L.

Purple Spurge

Procumbent, somewhat fleshy, glabrous annual, usually with 4 branches from the base; branches up to 40 cm high. Leaves (4-15-11 (-16) x 2.5-5(-10) mm, falcate-oblong, obtuse or emarginate, entire or almost so; base obliquely truncate; petiole 2-3 mm long. Stipules 1.5 mm long, subulate. Glands semicircular, reddish-brown, with small paler appendages. Capsule (3-)3.5-4(-4.5) x 4-5 mm, rather deeply sulcate, nearly smooth, purplish. Seeds 3 mm in diameter, ovoid-pyriform, smooth, pale grey, occasionally brown-mottled. Fl. 4-11.

Sandy sea shore and fields near the sea. Malta: rare at Ramla ta' San Tumas (S. & C.G.; Borg); Marsaxlokk (G.D.; Borg); Salini, Ghallis, Ghajn Tuffieha, Cnejna, Mellieha, St. Paul's Bay, Bahar id-Caghaq (Borg). Gozo: Ramla (S. & C.G.; Borg; Walseley); Marsalforn, Qbajjar (Borg). Comino (Borg).

Coast of Mediterranean and Atlantic north to S.W. England.

2. *E. chamaesyce* L. *E. canescens* L.

Gemmugha
Small Spurge

Procumbent, glabrous or villous annual with branches up to 30 cm high. Leaves (1-)3-7(-11) x (1-) 2.5-4.5(-6) mm, asymmetrically ovate-suborbicular to oblong, obtuse or emarginate, oblique at the base, nearly entire or obscurely serrulate; petiole c. 1 mm long. Stipules up to 1 mm long, triangular. Glands suborbicular, with small whitish appendages. Capsule 2 x 2 mm, rather deeply sulcate, smooth, glabrous to densely patent-pubescent. Seeds 1.2 mm in diameter, ovoid-quadrangular, irregularly tuberculate-rugulose, greyish. Fl. 5-11.

Two subspecies possibly occur. Subsp. *chamaesyce* is glabrous or pubescent; leaves less than 10 mm long, suborbicular-ovate, usually emarginate, often entire;

appendages not more than twice as wide as the glands, usually entire. Subsp. *massiliensis* (DC.) Thell. is villous; leaves usually up to 10 mm long, ovate-oblong, obtuse, serrulate; appendages more than twice as wide as the glands, often 3-lobed.

Fields and gardens. *Malta*: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley). Mediterranean region; W. Asia.

3. *E. maculata* L.

Genmugha hamra
Spotted Spurge

Procumbent annual, with branches up to 20 cm high. Stems pubescent. Leaves (2-)4-7(-13) x (0.5)1-2(-4) mm, ovate-oblong to oblong, slightly curved, obtuse or subacute, obliquely truncate at the base, serrulate near the apex, sparingly pubescent above, more densely so beneath, usually with a purple blotch on the midrib; petiole 0.5-1 mm long, shallowly sulcate, smooth, sparsely covered with closely appressed hairs. Seeds 0.8 mm in diameter, ovoid-quadrangular, with 3-4 transverse furrows on each face, brownish. Fl. 4-11.

Fields and gardens. *Malta*: rare near Attard and San Anton (S. & C.G.; Borg). Native of N. America; naturalised in S. and S.C. Europe.

Subgen. *Esula* Pers. Usually erect herbs or sometimes shrubs. Leaves exstipulate, usually alternate, symmetrical at base, sessile or subsessile. Cyathia almost always in umbels. Glands without petaloid appendages. Seeds usually with a caruncle.

Sect. *Pachycladae* (Boiss.) Tutin. Shrubs with stout branches. Leaves alternate, entire, present only on the current years growth. Glands suborbicular, entire or irregularly lobed. Capsule with indurated pericarp. Seeds smooth.

4. *E. dendroides* L.

Plate XXII

Tenghud tas-sigra
Tree Spurge

Stems up to 200 cm high, apparently dichotomously branched. Leaves 25-65 x 3-8 mm, oblong-lanceolate, obtuse-mucronulate. Ray leaves like the cauline but rather shorter and wider; raylet-leaves broadly rhombic, yellowish. Rays 5-8 dichotomous. Glands sub-orbicular, irregularly lobed. Capsule 5-6 mm long, the valves laterally compressed, smooth or nearly so. Seeds 3 mm in diameter, laterally compressed, grey. $2n = 18$. Fl. 12-5.

Rocky sides of valleys. *Malta*: frequent as at Wied il-Ghasel, Gnejna, Bingemma; (S. & C.G.; Borg; Wolseley); Wied Filep, Buskett, Dingli (Borg; Wolseley). *Gozo*: Xlendi, Mgarr, Wied Bingemma (S. & C.G.; Borg; Wolseley); Ta' Cent (Gulia; Borg; Wolseley); Qala, Nadur, San Blas (Borg; Wolseley). *Comino* (S. & C.G.; Borg; Wolseley).

Mediterranean region.

Sect. *Helioscopia* Dumort. Herbs or shrubs. Glands transversely ovate, not truncate, emarginate or with horns. Bracts present between male flowers. Capsule with indurated pericarp.

5. *E. biconae* Steudel

Sicilian Spurge

Glabrous shrub up to 150 cm high. Stems leafless below, densely leafy above, not persistent and spiny when dead. Leaves linear-lanceolate to ovate-lanceolate, acute or acuminate, rarely obtuse, entire. Ray leaves ovate, as long as or longer

than the rays; raylet-leaves broadly obovate. Rays 5, short, dichotomous. Capsule 3.5-4.8 mm long, glabrous, sulcate, with low broad tubercles. Seeds 3 mm in diameter, smooth, dark brown, shiny. Fl. 11-6.

Rocky places. *Malta*: occasional (G. Lanfranco), as at Ta' Baldu, Wied Eabu, Miahleb, Dingli (S. & C.G.; Borg); Wied iz-Zurrieq (Borg).

Sicilia; N. Africa.

6. *E. spinosa* L.

E. melitensis Parl.

Tenghud tax-Xagħar
Spiny Spurge

Glabrous, freely branched shrub 10-30 cm high. Dead branches and umbels more or less persistent but not pungent. Leaves 5-15 (-20) mm long, lanceolate or linear-lanceolate, entire. Ray-leaves obovate, about as long as rays, yellowish. Rays 1-5, very short, each usually with 1 cyathium. Capsule 2-4 mm in diameter, weakly sulcate, usually with long (rarely short) tubercles. Seeds 2-3 mm in diameter, smooth, brown. $2n = 14$. Fl. 11-6.

Arid, rocky places. *Malta*: frequent (G. Lanfranco), as along the south-west coastal cliffs (Borg; Wolseley); Wied Eabu, St. Paul's Bay, Marfa (S. & C.G.; Borg); Mellieħa (S. & C.G.; Borg; Kramer & Westra; Haslam); Dingli (Spencer, S. & C.G.; Borg; Wolseley); id-Dhar in Marfa area; Selmun area (Gauci). *Gozo*: between Wied ir-Rihan and Wied Bingemma (S. & C.G.); Nadur, Xagħra (Borg; Wolseley); Mgarr, Ta' Harraħ, Dabrani (Borg). *Comino*: (S. & C.G.; Borg; Haslam; Wolseley).

Mediterranean Europe.

7. *E. pubescens* Vahl.

Pubescent Spurge

Densely pubescent to subglabrous perennial up to 100 cm high. Stems stout, sometimes with axillary rays. Leaves oblong-lanceolate to entire. Ray-leaves elliptical to obovate; raylet-leaves rhombic-ovate, subcordate at base. Rays 5-6. Capsule (2-)3-4 mm long, deeply sulcate, villous or subglabrous, with oblong tubercles. Seeds (1.5-)2-2.5 mm in diameter, dark brown, with paler, small, irregular tubercles. $2n = 14$. Fl. 6-8.

Irrigated land. *Malta*: very rare at Ġnien il-Kbir (S. & C.G.; Borg); Marsa (GD., Borg). *Gozo*: rare at Xlendi (Gulia; Borg).

Mediterranean region.

8. *E. helioscopia* L.

Tenghud raddiena
Sun Spurge

Erect, glabrescent annual, usually with a single stem 10-50 cm high. Leaves obovate-spathulate, obtuse, serrate in the upper half. Rays and raylet-leaves like the cauline but smaller. Rays 5, trichotomous then dichotomous. Capsule 2.5-3.5 mm in diameter. Seeds 2 mm in diameter, reticulate-rugose. $2n = 42$. Fl. 11-5.

Waste and cultivated places. *Malta* and *Gozo*: very common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Almost throughout Europe; N. Africa; Asia.

Sect. *Cymatospermum* (Prokh) Prokh. Annuals; cauline leaves opposite or alternate, capsule with indurated mesocarp; seeds ornamented.

9. *E. aleppica* L.

Tenghūd
Aleppo Spurge

Glabrous or minutely papillose, somewhat glaucous annual up to 40 cm high, sometimes with up to 30 basal branches, and 1-9(-12) axillary rays. Leaves 10-25 (-50) x 0.2-3(-5) mm, very dense and closely imbricate, linear-subulate to linear-oblancoate, entire. Ray leaves like the upper cauline, raylet leaves ovate-rhombic to truncate or falcate, entire or irregularly toothed. Rays 2-4(-6), up to 5 times dichotomous. Glands with 2 horns, the horns paler than the glands. Capsule 2 mm in diameter, shallowly sulcate, more or less smooth. Seeds 1.5 mm in diameter, ovoid-tetragonous, grey, with white tubercles. Fl. 5-9.

Cultivated fields. *Malta*: locally frequent (G. Lanfranco), as at Kordin, Marsa, Zurriq, Luqa (S. & C.G.; Borg); Mdina, Addolorata cemetery (S. & C.G.); Buskett, Wardija, Girgenti, Ghajn Tuffieha, Bahrija, Zebbug (Borg). *Gozo*: Rabat, Ghajnsielem (Borg).

C. and E. Mediterranean region.

10. *E. exigua* L.

Tenghūd rqiqa
Dwarf Spurge

Glabrous annual up to 35 cm high, often much-branched from the base, with 0-3 (rarely more) axillary rays. Leaves 3-25 x 1-2 mm, linear to oblong-cuneate, entire. Ray leaves like the upper cauline. Raylet-leaves obliquely triangular-ovate-lanceolate, rarely 1- to 2-toothed on one side near the base. Rays 3-5, up to 7 times dichotomous. Glands with 2 horns, rarely the horns much reduced. Capsule 1.6-2 x 1.6 mm, shallowly sulcate, smooth but granulate on the keels. Seeds 1.2 mm in diameter, ovoid-quadrangular, vermiculate-rugose, grey. $2n = 14$. Fl. 1-5.

Cultivated and waste places. *Malta* and *Gozo*: frequent (S. & C.G.; Borg; G. Lanfranco; Kramer & Westra; Wolseley). *Comino* (S. & C.G.; Borg). *Cominotto* (Duthie).

Much of Europe except the east; N. Africa.

11. *E. sulcata* De Lens ex Loisel.

Tenghūd rqiqa
Furrowed Spurge

E. exigua var. *retusa* Cav.

Glabrous annual up to 10 cm high, often becoming much-branched from the base, with 0-1 axillary rays. Leaves 4-7 x 1-1.5 mm, linear to linear-oblancoate, entire. Ray-leaves slightly larger than the upper cauline. Raylet-leaves like the ray leaves but somewhat wider. Rays (2-)3-4(-5), often many times dichotomous. Glands with 2 horns. Capsule 1.7 x 1.7 mm, deeply sulcate, smooth. Seeds 1.25-1.5 mm in diameter, ovoid-hexagonal, with a longitudinal furrow on each face, pale grey, often darker in the furrows. Fl. 1-5.

Cultivated and waste places. *Malta* and *Gozo*: common (Borg).

S. W. Europe.

12. *E. peplus* L.

Tenghūd tal-gonna
Petty Spurge

Glabrous annual up to 40 cm high with 2 or more branches from the base and with 0-3 axillary rays. Leaves 5-25 x 3.15 mm, with petioles up to 8 mm long, ovate, suborbicular or obovate, entire. Ray-leaves like the cauline but with shorter petioles. Raylet-leaves smaller, slightly obliquely ovate. Rays 3, up to 5 times dichotomous. Glands with 2 filiform horns. Capsule 2 x 2 mm, shallowly sulcate, smooth; each valve with two dorsal ridges. Seeds 1.1-1.4 mm in diameter, ovoid-hexagonal, sulcate ventrally and pitted dorsally, pale grey, darker in the depressions. $2n = 16$. Fl. 11-4.

Cultivated and waste places. *Malta*, *Gozo* and *Comino*: common (S. & C.G.; Borg; G. Lanfranco; Kramer and Westra; Wolseley).

Most of Europe; W. Africa.

E. peplodes Gouan appears to be a dwarf variant of *E. peplus* with a poorly developed umbel and smaller seeds with fewer pits. It occurs in dry places in *Malta* (Borg; G. Lanfranco; Sell; Wolseley).

Sect. *Paralias* Dumort. Annual or perennial; leaves alternate, palmately veined; capsule with indurated mesocarp; seeds ornamented or smooth.

13. *E. pinea* L.

Tenghūd
Pine Spurge

Glabrous perennial, simple or branched from the base with 4-7 axillary rays. Stems densely leafy. Leaves 10-30 (-60) x 1.3 mm, linear to linear-lanceolate, entire. Ray leaves elliptic-oblong. Raylet-leaves deltate-rhombic, obtuse, base cuneate to subcordate. Rays 5(-6), up to 5 times dichotomous. Glands emarginate or with 2, rarely 4, horns. Capsule 2.5-3 x 3-3.5 mm, deeply sulcate, granulate-rugulose on the keels. Seeds 1.5-2 mm in diameter, ovoid, pale grey. $2n = 16$. Fl. 2-11.

Cultivated and waste places. *Malta*, *Gozo* and *Comino*: common (S. & C.G.; Borg; G. Lanfranco; (Wolseley). *Cominotto*, *Filija*: (Borg).

W. & C. Mediterranean region; S.W. Europe.

14. *E. umbellata* Poir.

Clustered Spurge

Glabrous perennial up to 65 cm high, occasionally branched from the base with (6-)8-20(-27) axillary rays usually clustered together to form a whorl below the umbel, and with 0-10(-19) more widely spaced axillary rays. Leaves 20-55 x 2-12 mm, linear to linear-lanceolate, entire. Ray-leaves lanceolate to ovate-deltate. Ray-leaves reniform to deltate-rhombic. Rays 8-21, up to 4 times dichotomous. Glands with somewhat clavate horns. Capsule 3-3.8 x 3.5-4 mm shallowly sulcate, granulate on the keels. Seeds 2.3 mm in diameter, ovoid-cylindrical, irregularly and shallowly rugulose, pale grey, darker in the depressions. Fl. 3-6.

Humid places. *Malta*, Wied Baba (G.D.; Borg); Marsa (Gulia; Borg).

W. Mediterranean region.

15. *E. paralias* L.

Tenghūd tar-ramel
Sea Spurge

Glabrous, glaucous, somewhat fleshy, caespitose, perennial up to 70 cm high, branched from the base and with 0-9 axillary rays. Leaves 3-30 x 2-15 mm, lowest ones obovate-oblong, middle ones elliptic-oblong and upper ones ovate; all entire, adaxially concave, imbricate. Ray leaves like the upper cauline. Raylet-leaves suborbicular-rhombic to reniform, strongly adaxially concave. Rays 3-6, up to 3 times dichotomous. Glands emarginate. Capsule 3-5 x 4.5-6 mm, deeply sulcate, granulate on the keels. Seeds 2.5-3.5 mm, broadly ovoid, smooth, pale grey. $2n = 16$. Fl. 4-9.

Sandy sea shores. *Malta*, local (G. Lanfranco) as at Gnejna, Ramla ta' San Tumas, Marfa (S. & C.G.; Borg; Wolseley) Salina (G.D.; Borg); Ghadira (Borg; Wolseley);

Ramla tat-Torri (Gauci). Gozo: Ramla (S. & C.G.; Borg; Kramer & Westra; Wolseley). Comino (S. & C.G.; Borg).

Coast of W. Europe and Mediterranean.

Sect. *Esula* Pers. Perennial; cauline leaves alternate, pinnately veined; glands truncate or with 2 horns; capsules with indurated pericarp; seeds smooth.

16. *E. terracina* L.

Tengħud tax-xit
Coastal Spurge

Glabrous perennial; stems up to 70 cm high, simple or branched from the base and with 0.5 axillary rays. Leaves 15-40(-55) x 4-7(-11) mm, linear-lanceolate to elliptic-oblong, rarely linear, minutely serrulate. Ray-leaves resembling the upper cauline. Raylet-leaves deltate-rhombic, sometimes slightly asymmetrical, occasionally coarsely serrulate. Rays 4-5, up to 5 times dichotomous. Glands with 2 long slender horns. Capsule 3.5 x 4.5 mm, deeply sulcate, smooth. Seeds 2-2.5 mm long, ovoid, pale grey. Fl. 4-9.

Sea shores Malta: rare (G. Lanfranco), as at Ghadira (S. & C.G.; Borg; Wolseley). Gozo: Ramla (S. & C.G.; Borg).

Mediterranean region.

17. *E. chavacias* L.

E. melapetala Gasparr.

Large Spurge

Densely tomentose, rarely glabrescent, glaucous, caespitose, perennial, sometimes with biennial stems up to 180 cm high, with 13-30(-40) axillary rays. Leaves (14-)30-130 x 4-10(-17) mm, linear to oblanceolate or occasionally obovate, entire; those of the first years growth usually larger than those of the second. Ray leaves like the upper cauline. Raylet leaves suborbicular deltate, usually connate in pairs at the base. Rays variable. Capsule 4.7 x 5.6 mm, deeply sulcate, smooth, densely villous. Seeds 2.5-3.8 mm in diameter, ovoid, silver-grey. Fl. 14.

Rocky sides of valleys. Malta: Wied Inċita, Wied il-Għasel, Bingemma, Buskett (S. & C.G.; Borg); Dingli, Wied Gerżuma (Borg), Għirgenti (Wolseley). Gozo: Ramla, Xlendi, Ta' Ġenċ (S. & C.G.; Borg); Wied Qasab (Gulia); Dwejra (S. & C.G.); Borg; Kramer & Westra; Wolseley); San Dimitri, Mgarr ix-Xini (Duthie, S. & C.G.; Borg).

Mediterranean Europe; S.W. Asia.

RUTALES

XLIV. RUTACEAE

Herbs, shrubs or trees. Leaves alternate or opposite, simple or compound, dotted with translucent glands, exstipulate, sometimes reduced to spines. Flowers usually hermaphrodite and actinomorphic. Sepals 4-5, free or connate below. Petals 4-5, disc present. Stamens as many or twice as many as the petals, rarely more, free or rarely monadelphous. Ovary superior, usually syncarpous and often 4- to 5-locular, but carpels occasionally united at the base only or rarely free. Styles as many as the carpels, free or connate.

Herbs; fruit a capsule

Trees or large shrubs; fruit fleshy

1. Ruta
2. Citrus

Subfam. RUTOIDEAE

Fruit a capsule, usually 4- to 5-valved. Seeds with endosperm.

1. Ruta L.

Perennial herbs, more or less woody below. Leaves alternate, 2-to 3-pinnatisect, ultimate segments linear or obovate. Inflorescence cymose, bracteate. Sepals and petals 4, or frequently 5 in the central flower. Petals cucullate, yellow, dentate or ciliate or more rarely entire. Stamens twice as many as the petals; filaments glabrous, attenuate. Capsule 4- to 5-lobed, dehiscent. Styles connate.

Petals fringed with long cilia
Petals denticulate, without long cilia

1. *chalepensis*
2. *graveolens*

1. *R. chalepensis* L.
- R. bracteosa* DC.

Plate XXII

Feigel
Wall Rue

Whole plant foetid when bruised. Stems 20-60 cm. high, glabrous. Lower leaves more or less petiolate; ultimate segments 1.5-6 mm. wide, narrowly oblong-lanceolate or obovate. Inflorescence lax; pedicels as long as or longer than the capsule; branches and pedicels glabrous, rarely a very few minute glands above; bracts wider than the subtended branch, the lower several times so, cordate-ovate. Sepals glabrous, deltate-ovate. Petals oblong, fringed with cilia not as long as the width of the petal. Capsule glabrous; segments acuminate. Fl. 3-6.

Rocky and arid places. Malta, Gozo and Comino: frequent on the coralline plateaus (S. & C.G.; Borg; G. Lanfranco; Wolseley). Comino: (S. & C.G.; Borg).

Mediterranean region; Atlantic Islands.

2. *R. graveolens* L.

Garden Rue

Glabrous throughout; stem 14-45 cm. high. Lower leaves more or less long-petiolate, the uppermost subsessile; ultimate segments 2-9 mm. wide, lanceolate to narrowly oblong or obovate. Inflorescence rather lax; pedicels as long as or longer than the capsule; bracts lanceolate, leaf-like. Sepals lanceolate, acute. Petals oblong-ovate, denticulate, undulate. Capsule glabrous; segments somewhat narrowed above to an obtuse apex. Fl. 3-5.

Malta: Għajna (Penza).

Mediterranean region; perhaps native only in Balkan Peninsula and Krym, as is often grown in gardens from which it escapes.

Subfam. AURANTIOIDEAE

Fruit a berry with a thick, coriaceous rind or harder shell, and a juicy pulp. Seeds without endosperm.

2. Citrus L.

Small trees. Young twigs with single spines in the leaf-axils, but older branches often unarmed. Leaves alternate, simple, coriaceous, thin; lateral veins few. Petioles often more or less winged or margined and articulated with the lamina. Flowers white, solitary and axillary or in short axillary racemes. Sepals 4-5; petals (4-) 5 (-8). Stamens 4-10 times as many as the petals. Ovary usually 10- to 14-locular; ovules in 2 rows. Seeds surrounded by stipitate, fusiform pulp-vesicles.

All species are cultivated particularly in W. Malta and E. Gozo; and are probably derived from plants which are native in tropical and subtropical parts of S. E. Asia.

1. Petiole terete or carinate-margined but not winged; fruit 15-22 cm. in diameter
Petiole distinctly winged; fruit not more than 15 cm. in diameter
2. Stamens generally more than 4 times as many as the petals; flowers of two sorts, hermaphrodite and functionally male
Stamens about 4 times as many as the petals; flowers usually all hermaphrodite

1. *medica*

2.

3.

4.

3. Fruit acid; flowers tinged or streaked with purple
Fruit insipidly sweet; flowers pure white
4. Leaves narrowly elliptical; fruit rarely more than 6.5 cm. in diameter; rind very easily detached from the segments
Leaves broadly elliptical; fruit 7-15 cm. in diameter, spherical or broadly ovoid; rind adhering to the segments

2. *limon*
3. *limetta*

5. Fruit 10-15 cm. in diameter
Fruit 7.5-10 cm. in diameter

4. *deliciosa*

5.

6.

6. Fruit with bellow and mammiform process at apex
Fruit with more or less orange rind and no mammiform process

8. *bergamia*

7.

7. Fruit with a rough rind and bitter sour pulp; petioles obovate in outline
Fruit with a sweet taste and nearly smooth rind; petioles oblanceolate in outline

6. *sinensis*
7. *sinensis*

1. *C. medica* L.

Citron

Small tree. Twigs angular when young, soon terete, glabrous, with short, stout, axillary spines. Leaves glabrous, elliptic-ovate to ovate-lanceolate, crenate to serrate veins prominent on both surfaces. Petiole terete or narrowly margined. Flowers in short, few-flowered racemes, hermaphrodite or functionally male; petals often pink or purplish on the outer surface. Stamens very numerous, coherent in groups of four or more. Fruit 15-25 cm. long, 10- to 13-locular; rind very thick, often rough and warty, yellow when ripe; pulp pale green or yellow, acid or sweetish.

Malta and Gozo: cultivated (Borg).

2. *C. limon* (L.) Burm. fil.
C. medica var. *limon* L.

Plate XXIII

Lumi
Lemon

Small tree. Twigs angled when young, soon rounded, glabrous, with stout axillary spines. Leaves broadly elliptical, acute, serrate or crenate. Petiole with narrow wing or merely margined, distinctly articulated with the lamina. Flowers solitary or in short, few-flowered racemes, hermaphrodite or functionally male; petals purplish-suffused on the outer surface. Stamens 25-40, coherent in groups. Fruit 6.5-12.5 cm. in diameter, 9- to 10-locular, yellow when ripe, oblong or ovoid with a broad, low, mamilliform process at apex; rind somewhat rough to almost-smooth; pulp acid.

Malta and Gozo: widely cultivated (Borg; Bowen-Jones et al.).

3. *C. limetta* Risso

Lumicelli
Sweet Lemon

Like *C. limon* but flowers pure white; fruit shorter, sweet.
Malta and Gozo: cultivated (Borg).

4. *C. deliciosa* Ten.
C. aurantium var. *nobilis* Lour.

Mandulina
Tangerine

Small, spreading tree. Twigs spiny, slender. Leaves narrowly elliptical. Flowers solitary or in small axillary clusters. Fruit 5-7 cm. in diameter, depressed-globose; rind thin, easily separated from the pulp, bright orange when ripe; pulp sweet.

Malta and Gozo: widely cultivated (Borg).

5. *C. paradisi* Macfadyen
C. decumana L.

Laring tar-rjus
Grapefruit

Spiny tree with rounded crown. Twigs angular, glabrous. Leaves 10-15 cm. long, broadly elliptical, rounded or sometimes cordate at the base, subacute at the apex; midrib glabrous. Petiole very broadly winged, frequently up to 15 mm. wide near the top, obcordate in outline and tapering below. Flowers in axillary clusters or terminal racemes. Stamens 20-25. Fruit 10-15 cm. in diameter, depressed-globose or subpyriform; rind thick, pale yellow when ripe; pulp with coarse vesicles.

Malta and Gozo: cultivated (Borg).

6. *C. aurantium* L.

Laringa tal-bakkajaw
Seville orange

Tree with a rounded crown. Twigs angular when young, soon terete, with slender axillary spines. Leaves 7.5-10 cm. long, broadly elliptical, subacute at the apex, cuneate to rounded below. Petioles rather broadly winged above, tapering to a wingless base. Flowers solitary or few in the axils, very fragrant. Fruit c. 7.5 cm. in diameter, subglobose, slightly flattened at both ends, 10- to 12-locular; rind thick, rough, orange when ripe; pulp acid; core hollow when ripe.

Malta and Gozo: once widely cultivated (Borg), but now rarely seen, the old trees being used as stocks for sweet (Orange and Lemon (Bowen-Jones et al)).

7. *C. sinensis* (L.) Osbeck
C. aurantium var. *communis* Borg.

Laringa helwa
Sweet Orange

Tree with a rounded crown. Twigs angular when young, soon terete, with few, slender rather flexible axillary spines. Leaves acute, rounded below. Petioles narrowly winged. Flowers in short lax racemes or solitary, fragrant. Fruit depressed-globose to shortly ovoid, 10-13-locular; rind thin to rather thick, nearly smooth, orange to orange-yellow when ripe; pulp sweet; core remaining solid when ripe.

Malta and Gozo: cultivated (Borg; Bowen-Jones et al.; Wolseley).

8. *C. bergamia* Risso & Poiteau

Bergamotta
Yellow Orange

Small tree with winged petioles and oblong-ovate leaves. Fruit pyriform, 7.5-10 cm. in diameter, yellow at maturity; rind thin, bitter and aromatic.

Malta and Gozo: cultivated for the oil yielded by its rind.

XLV. SIMAROUBACEAE

Trees or shrubs with bitter bark. Leaves pinnate, alternate. Flowers actinomorphic, 5-merous. Petioles free. Disc 10-lobed. Stamens 10 in male flowers, 2-3 in hermaphrodite flowers; filaments free. Ovary superior; carpels 5-6, more or less connate, unilocular, each with 1 ovule attached to the inner angle; styles 2-5, connate. Fruit drupe-like, a berry or a group of samaras.

1. *Ailanthus* Desf.

Deciduous trees. Flowers polygamous, in large terminal panicles. Fruit a group of samaras.

1. *A. altissima* (Miller) Swingle

Plate XXIII

Xumak falz.
Tree-of-Heaven

Up to 20 meters high, freely suckering. Bark smooth, grey. Leaves 45-60 cm long, glabrous or nearly so; leaflets 7-12 cm. long, 13-25, lanceolate-ovate, long-acuminate, ciliate, with 2-4 teeth near the base, each with a large gland beneath. Panicles 10-20 cm. long. Flowers 7-8 mm. in diameter, greenish. Samaras 2-4 cm long, reddish when young. Fl. 5-7.

Planted for ornament; occasionally naturalised. *Malta*: frequent (S. & C.G.; Borg, G. Lanfranco; Sell; Wolseley); naturalised in many places as at Attard Rabat road, fortifications of Valletta and Floriana (Wolseley). *Gozo*: (S. & C.G.; Borg); naturalised in Mgarr valley (Wolseley). *Comino*: (S. & C.G.; Borg).

Native of China; cultivated and naturalised in tropical and temperate regions.

XLVI. MELIACEAE

Trees or shrubs. Leaves pinnate, alternate. Flowers actinomorphic, usually hermaphrodite, usually 5-merous. Petals free or connate at base. Stamens twice as many as petals, monadelphous. Ovary superior, with 2-8 loculi; placentation axile; style 1. Fruit a capsule, drupe or berry.

1. *Melia* L.

Trees or shrubs. Leaves pinnate, alternate. Flowers actinomorphic, usually hermaphrodite, usually 5-merous. Petals free or connate at base. Stamens twice as many as petals, monadelphous. Ovary superior, with 2-8 loculi; placentation axile; style 1. Fruit a capsule, drupe or berry.

1. *M. azederach* L.

Plate XXIII

Sigra tat-tosku
Indian Lilac

Up to 15 m. high. Bark furrowed. Leaves up to 90 cm. long, 2-pinnate; leaflets 2.5-5 cm. long, ovate-lanceolate to elliptical, acute, serrate or lobed. Panicles 10-20 cm. long. Flowers lilac, fragrant; petals c. 18 mm. long. Fruit 6-18 mm. in diameter, subglobose. Fl. 3-5.

Widely planted for ornament. *Malta*: naturalised in many places (Borg; Wolseley).

Native of S. and E. Asia; cultivated in hot and temperate regions.

XLVII. POLYGALACEAE

Leaves simple, exstipulate. Flowers hermaphrodite, zygomorphic, in spikes or racemes. Sepals 5, free; petals 3-5, more or less united; stamens 8, with filaments partly united. Ovary 2-locular, with 1 seed in each loculus.

1. *Polygala* L.

Small, perennial herbs, rarely annuals or small shrubs. Leaves usually alternate, entire or subentire. Flowers usually in terminal racemes, rarely in axillary racemes or solitary in leaf-axils. Sepals unequal, the 2 inner (*wings*) much larger than the 3 outer. Petals 3, united proximally into a corolla-tube, free distally, the lower (*keel*) of different form from the 2 upper, and usually bearing a fimbriate crest. Filaments partly or wholly united into a tube, which is partly adnate to the corolla-tube. Gynophore often present, usually elongating in fruit. Stigma 2-lobed, only the posterior lobe receptive. Capsule compressed, usually with a marginal wing. Seeds hairy, with a usually 3-lobed strophiole.

Shrub 100-250 cm. high
Herb less than 10 cm. high

1. *myrtifolia*
2. *monspeliaca*

1. *P. myrtifolia* L.

African Milkwort

Erect shrub 100-250 cm. high. Leaves 2.5-5 cm. long, oblong to obovate, obtuse. Racemes short, few-flowered, pseudolateral; bracts persistent. Wings 15-20 mm. long, violet-purple. Corolla 13-18 mm long, lilac, shading to deep violet at apex of keel; upper petals short, 2-lobed, the upper lobe reflexed. Capsule elliptical-orbicular, emarginate, narrowly winged.

Cultivated for ornament and occasionally self-sown. *Malta*: (Borg; Deller).

Native of S. Africa; cultivated for ornament in temperate regions.

2. *P. monspeliaca* L.

Plate XXIII

Mediterranean Milkwort

Erect annual. Leaves 10-25 mm. long, lanceolate to linear-lanceolate, acute. Racemes terminal. Outer sepals c. 3 mm. long, linear-lanceolate, subequal; wings 5-8 mm. long, narrowly elliptical, acute, greenish-white, with 3 marginal veins and numerous lateral branches, not anastomosing. Corolla about 4 mm. long, whitish; crest of keel large. Filaments united for most of their length, ciliate above. Lower lobe of stigma large. Capsule sessile, obcordate. $2n = c.38$. Fl. 3-5.

Arid, rocky places. *Malta* and *Gozo*: frequent (S. & C.G.; Borg; G. Lanfranco; Kramer & Westra).

Mediterranean region.

XLVIII. ANACARDIACEAE

Trees or shrubs. Leaves alternate, usually pinnate or digitate. Calyx usually 5-partite; petals 5, rarely absent, free or more or less connate; ovary superior, 1-locular, with 1 ovule; placentation basal or apical. Fruit a drupe.

1. Mature leaves and young twigs hairy
Mature leaves and young twigs glabrous except sometimes the petioles

1. *Rhus*

2. Leaves up to 15 cm. long; petals 0
Leaves 25 cm. or more; petals 5

2. *Pistacia*
3. *Schinus*

1. *Rhus* L.

Polygamous or dioecious shrubs or small trees, often with resinous bark. Buds naked. Leaves digitate or pinnate. Flowers small, in axillary or terminal panicles. Petals 5. Stamens 5. Placentation basal. Fruit with a short, non-plumose pedicel; styles terminal.

1. *R. coriaria* L.

Plate XXIII

Xumak tal-Konza
Sumach

Almost evergreen shrub or small tree up to 3 m. high. Young twigs and petioles densely hispid. Leaves imparipinnate; leaflets 1-5 cm. long, 7-21, ovate to oblong, coarsely crenate-serrate, sometimes with 1-2 small lobes at base; rachis hispid, winged at least between the distal leaflets. Inflorescence c. 10 cm. long, the branches more or less concealed by the flowers. Sepals ovate, greenish; petals oblong, white, longer than the sepals. Drupe shortly hispid, brownish-purple. Fl. 5-6.

Rocky places. Malta: rare at Hal Far (S. & C.G.); Wied Znuber (Borg); Wied Qirda (Evans).

Mediterranean region; W. Asia; Atlantic Islands.

2. *Pistacia* L.

Dioecious trees or shrubs with resinous bark. Buds with several scales. Leaves pinnate, occasionally some reduced to 1 leaflet. Flowers in lateral panicles. Petals absent. Stamens 3-5. Placentation basal.

Leaves imparipinnate; panicles with long branches
Leaves paripinnate; panicle spike-like

1. *terebinthus*
2. *lentiscus*

Terebinth

1. *P. terebinthus* L.

Small deciduous tree or shrub up to 5 m. high. Leaves imparipinnate; leaflets usually 2-8.5 x 1-3.5 cm., 3-9, ovate to obovate or oblong, mucronate, coriaceous; rachis not winged; petioles glabrous. Inflorescence with long branches. Flowers brownish. Drupe 5-7 x 4-6 mm, obovoid, compressed, apiculate, at first reddish, becoming brown. Fl. 4-7.

Valleys; frequently planted. Malta: Buskett (Borg; Haslam; Wolseley); frequently planted elsewhere as in Mdina, Birkirkara, Pietà, etc.

Mediterranean region.

2. *P. lentiscus*

Plate XXIII

Deru
Lentisk

Small evergreen tree or shrub 1-8 m. high. Leaves paripinnate; leaflets 1-5 x 0.5-1 cm., (4-) 8-12, lanceolate to obovate-lanceolate, mucronate, coriaceous; rachis broadly winged; petioles glabrous. Inflorescence compact, spike-like. Flowers yellowish or purplish. Drupe c. 4 mm. in diameter, globose, apiculate, red becoming black. Fl. 1-2.

Rocky sides of valleys. Malta: frequent (G. Lanfranco), as at Ta' Baldu, Wied Babu (S. & C.G.; Borg; Wolseley); Buskett (S. & C.G.; Borg; Haslam; Wolseley); Bahrija, Gnien il-Kbir, Wied il-Ghasel, Wied Incita (Borg; Wolseley); Wied Gerzuma (Borg); Wied Hażrun, Mistra, Victoria Lines (Wolseley); Wardija (Haslam; Wolseley); Mellieha and Mellieha ridge (Penza; Wolseley; Kramer & Westra). Gozo: Mgarr ix-Xini (S. & C.G.; Borg; Wolseley); Chambray (Borg); Xlendi (Borg; Wolseley); Xaghra (Wolseley).

Mediterranean Europe, Asia Minor, Syria; N. Africa, Somalia, Canaries.

3. *Schinus* L.

Polygamous trees or shrubs. Buds with several scales. Leaves pinnate. Flowers in lateral and terminal panicles. Sepals 5. Petals 5. Stamens 10. Placentation apical.

Rachis unwinged; drupe 6-7 mm. in diameter, pink

1. *molle*

Rachis winged in upper parts; drupe 4-5 mm. in diameter, bright red

2. *terebinthifolia*

1. *S. molle* L.

Drooping False-pepper

Evergreen tree or shrub usually up to 8 m. high. Branches slender, pendulous. Leaflets 2.5-6 x 3-8 mm., 7-13 pairs, linear-lanceolate, often serrate, pubescent when young; rachis unwinged. Inflorescence much-branched, lax. Flowers white. Drupe 6-7 mm. in diameter, globose, pink.

Malta and Gozo: widely planted for ornament (Borg; Valletta).

Native of C. and S. America; widely cultivated

2. *S. terebinthifolia* Raddi

Upright False-pepper

Like *S. molle* but branches not pendulous; leaflets 10-20 mm. wide, 2-7 pairs; rachis winged in upper part; inflorescence dense; drupe 4-5 mm. in diameter, bright red.

Malta and Gozo: widely planted for ornament (Borg; Valletta).

Native of S.W. Brazil, Paraguay; widely cultivated.

RHAMNALES

XLIX. RHAMNACEAE

Trees or shrubs with simple, usually stipulate leaves. Inflorescence cymose. Flowers perigynous. Calyx 4- to 5-lobed, lobes valvate in bud. Petals 4-5, often small, sometimes absent, inserted at mouth of hypanthium and often hooded over the stamens. Stamens 4-5, alternating with the calyx lobes; anthers versatile. Ovary superior, 2- to 4-locular; ovules solitary. Fruit often fleshy.

1. Stipules soft, often caducous
Stipules spinescent, persistent

3. *Rhamnus*
2.

2. Young twigs puberulent; fruit dry, winged
Young twigs glabrous; fruit fleshy, unwinged

1. *Paliurus*
2. *Ziziphus*

1. *Paliurus* Miller

Stipules spinescent. Flowers 5-merous, hermaphrodite. Styles 2-3. Fruit dry, hemispherical, with a wide membranous wing round the top.

1. *P. spina-christi* Miller

Plate XXIV

Xewk tal-kuruna
Christ's Thorn

Nearly glabrous much branched shrub up to c. 3 m. high. Twigs flexuous, puberulent when young. Leaves 2-4 cm. long, alternate and distichous, ovate, crenate-serrate, shortly petiolate. Flowers in small, axillary, shortly pedunculate cymes. Fruit 18-30 mm. in diameter; wing undulate. Fl. 4-6.

Gozo: isolated plants in fissures of the rock at Xlendi (Penza; Borg; Kramer & Westra). Argotti Gardens (Wolseley).

Mediterranean region; W. Asia.

2. *Zizyphus* Miller

Stipules spinescent. Flowers 5-merous, hermaphrodite. Styles 2-3. Fruit a fleshy drupe.

1. *Z. jujuba* Miller
Z. sativa Gaertner

Zinzel
Jujube

Shrubs or small trees up to 8 m. high. Twigs flexuous, glabrous when young, green. Leaves 2-5.5 cm. long, alternate, oblong, obtuse, glandular-denticulate, shortly petiolate. Flowers few, in a small axillary cyme which is longer than its peduncle. Drupe 1.5-3 cm. in diameter, ovoid-oblong, dark reddish or almost black, edible. Fl. 5-6.

Formerly cultivated for its fruit and wood; naturalised in old gardens and valleys. Malta: Ta' Baldu and Girgenti (S. & C.G.); Mtableb (Wolseley); St. Paul's Bay (Zammit-Macempel).

Native of Temperate Asia; naturalised in Mediterranean regions.

3. *Rhamnus* L.

Germination epigeal. Winter buds with scales. Stipules subulate, caducous. Flowers 4-merous, sometimes 5-merous, usually unisexual but monoecious. Styles 3-4; stigmas small. Fruit a drupe with 2-4 pyrenes.

Large shrub up to 5 m. high; spines 0; flowers 5-merous
Small shrub up to 1 m. high; spines present; flowers usually 4-merous

1. *alaternus*
2. *lycioides*

1. *R. alaternus* L.

Alaternu
Mediterranean Buckthorn

Nearly glabrous shrub up to 5 m. high, very variable in habit. Leaves (1-2) 2-6 cm. long, lanceolate to ovate, acute to obtuse, often mucronate, entire or remotely denticulate, coriaceous; petiole 1-8 mm. long. Inflorescence dense, more or less pubescent; bracteoles ciliolate, usually caducous. Calyx-lobes lanceolate, acute, yellow; petals absent. Drupe 4-6 mm. in diameter, not fleshy, obovoid, reddish becoming black; pyrenes 3. Fl. 1-3.

Cultivated and naturalised. Malta: rare at valley of the Addolorata Cemetery (S. & C.G.; Wolseley); Buskett (Borg; Wolseley); San Anton, Fortifications of Floriana (Borg); Ballut tal-Wardiya (Silverwood; Wolseley); Tal-Virtu (Wolseley).

Mediterranean region.

2. *R. lycioides* L. subsp. *oleoides* (L.) Jahandiez & Maire
R. oleoides L.

Plate XXIV

Zija
Small Buckthorn

Much-branched, glabrous or puberulent shrub up to 1 m. high. Leaves 1-4 x 0.31 cm., usually coriaceous, evergreen or deciduous, obovate, obtuse or emarginate, sometimes mucronate, entire, rarely crenulate; lateral veins distinctly visible on upper surface; petiole 2-3 mm. long; stipules caducous. Calyx-lobes lanceolate, acute, yellowish; petals absent or very small; flowers unisexual. Drupe 4-6 mm. in

diameter, obovoid, compressed laterally, yellowish or sometimes blackish when ripe; pyrenes 2. Fl. 2-4.

Rocky places. Malta and Gozo: locally frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region.

L. VITACEAE

Shrubs usually diffuse and climbing by means of leaf-opposed tendrils. Leaves alternate, stipulate, usually palmately lobed or divided. Flowers small, actinomorphic, in terminal or leaf-opposed cymes or panicles. Sepals 5, united; petals 5, free or united distally; stamens 5, antepetalous. Ovary superior, 2-locular; style and stigma 1; fruit a berry with 2-4 seeds.

1. *Vitis* L.

Bark usually peeling from old stems in long shreds. Leaves simple, usually palmately lobed. Petals cohering at the apex, falling at anthesis without separating. A 5-lobed, glandular disc present at base of ovary.

1. *V. vinifera* L. subsp. *vinifera*

Plate XXIV

Diella
Grape Vine

Stems up to 33 m. high, climbing over trees but in cultivation usually reduced by annual pruning to 1-3 m. high. Leaves 5-15 cm. long, orbicular in outline, cordate, usually palmately 5- to 7-lobed, irregularly toothed, glabrescent above, often with persistent tomentum beneath. Tendrils branched, normally occurring opposite 2 leaves out of every 3. Flowers numerous, in rather dense panicles, which replace the tendrils in the upper part of the stem. Calyx very strongly 5-lobed. Petals c. 5 mm. long, pale green. Fruit 6-22 mm. long, ellipsoid to globose, green, yellow, red or purplish-black, sweet; seeds 0-2, pyriform with a rather long beak. Fl. 4-5.

The cultivated vine is, like most plants long established in cultivation, impossible to accommodate satisfactorily in any orthodox taxonomic scheme. The vines of Europe are certainly derived, at least in part, by selection from the wild vine subsp. *sylvestris* (C.C. Gmelin) Hegi, which is native in a large part of C. and S.E. Europe (but absent from Malta), though the practice of cultivation (and therefore the cultivated clones) probably originated in S.W. Asia. During the last century many species of *Vitis* have been introduced into Europe from N. America. These are more or less resistant to the attacks of *Viteus vitifolia* ('phylloxera'), a parasitic aphid which did immense damage to European vines from 1867 onwards. American vines are now used almost exclusively as stocks; the scions grafted on these are either cultivars of the European vine, or hybrids between it and American species, or of purely American species and hybrids. In Borg's day there were over 140 different kinds of Vine in the Maltese Islands of which at least 40 were local.

Malta, Gozo and Comino: widely cultivated in many varieties especially in the western half of Malta for wine-making and fruit; frequently naturalised in valleys and field margins (Borg; Wolseley).

MALVALES

LL. MALVACEAE

Herbs, shrubs or small trees with simple (but sometimes deeply palmatisect), alternate, stipulate leaves. Flowers regular, hermaphrodite. Bracteoles usually present immediately below the calyx, forming an epicalyx. Sepals 5, united at the

base; petals 5, free or united slightly at the base. Stamens numerous, the filaments united for most of their length to form a tube which surrounds the ovary and styles. Ovary superior, of 4 or more (usually numerous) carpels. Styles usually free. Fruit a schizocarp or a loculicidal capsule.

1. Epicalyx absent
Epicalyx present
2. Carpels 3-5; fruit a capsule
Carpels at least 6; fruit a schizocarp
3. Epicalyx segments broadly ovate to deltate
Epicalyx segments linear
4. Epicalyx segments 5 or more
Epicalyx segments 2-3
5. Staminal tube terete; flowers not more than 30 mm. in diameter, at least some of them on conspicuous pedicels or peduncles
Staminal tube 5-angled; flowers at least 30 mm. in diameter, subsessile in a spike-like inflorescence
6. Epicalyx-segments united at the base, at least in bud
Epicalyx-segments free, even in bud
7. Mericarps forming a more or less globose head; petals not emarginate; epicalyx-segments wider than sepals
Mericarps not inflated; petals emarginate or 2-lobed; epicalyx-segments narrower than sepals

1. Malope L.

Herbs. Flowers long pedicellate; solitary in the leaf-axils. Epicalyx segments 3, free, ovate to orbicular, cordate, wider than the sepals. Petals not emarginate. Stigmas lateral, filiform. Mericarps numerous, 1-seeded, indehiscent, glabrous, rugose, irregularly arranged in a globose head.

Plate XXV

1. M. malachoides L.

Perennial or perhaps sometimes annual, hispid at least above. Stems 25-50 cm. high, several, ascending, usually simple. Lower leaves 20-50 x 12-35 mm., oblong-lanceolate to ovate, crenate; the upper similar or 3-lobed. Epicalyx segments 8-12 x 6-8 mm. in flower, strongly accrescent, cordate-orbicular, acuminate, wider and shorter than the lanceolate, acuminate sepals. Petals 20-40 mm. long, deep pink or purple. Fl. 4-6.

In fields and valleys on the Blue Clay. Malta: rare (G. Lanfranco), as at Gnejna, Ghajn Rihana (S. & C.B.; Borg); Mtahleb, Ghajn Tuffieha (Gulia; Borg); San Martin, Wardija (Borg); Wied il-Qiegha, Wied Inetta (Lanfranco). Gozo: Wied il-Lunzjata, Pergla (Gulia; Borg).

Mediterranean region; W. Asia.

2. Malva L.

Herbs. Epicalyx-segments 2-3, free. Petals emarginate or 2-lobed, purple, pink or white. Stigmas lateral, filiform. Fruit a schizocarp; mericarps numerous, 1-seeded,

indehiscent, dark brown or black, arranged in a single whorl around the short, conical or flattened apex of the receptacle.

Many species are variable in indumentum and leaf-shape. In most the basal leaves are subentire. Sepal-characters refer to the fully open flower, unless the contrary is stated; the measurements exclude the basal part of the sepal which is fused to others.

1. Sepals linear to narrowly triangular, more than three times as long as wide
Sepals ovate or triangular, not more than 3 times as long as wide
2. Petals 4-5 mm. long, only slightly exceeding the sepals
Petals 9-30 mm. long, at least twice as long as the sepals
3. Petals 12-30 mm. long, bright purple or pink with darker veins
Petals 9-13 mm. long, pale lilac to whitish, without darker veins

1. cretica

2.

4. parviflora

3.

2. sylvestris

3. nicaeensis

1. N. cretica Cav.

Hobbejza tat-toroq
Mediterranean Mallow

Erect annual up to 40 cm. high, more or less hispid with long patent hairs. Lower leaves suborbicular, crenate or slightly lobed; upper leaves usually deeply divided into 3(-5) oblong, dentate lobes. Flowers axillary, on long pedicels. Epicalyx segments 3, linear to narrowly triangular; sepals 7-10 mm. long, similar in shape; staminal tube glabrous. Mericarps glabrous; dorsal face flat, with numerous small, transverse ridges; angles slightly winged. Fl. 3-6.

Arid waste places, roadsides and fields. Malta, Gozo and Comino: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley). Cominotto: (Duthie; Borg).

Mediterranean region.

2. M. sylvestris L.

Plate XXV

Hobbejza tar-raba
Common Mallow

Biennial or perennial, with simple and stellate hairs. Stems up to 150 cm. high, erect to decumbent, woody at the base. Leaves very variable in size, reniform to suborbicular-cordate, more or less palmatifid, with 3-7, semicircular to oblong, crenate lobes. Epicalyx-segments oblong-lanceolate to elliptical; sepals stellate-pubescent beneath; petals 12-30 mm. long pink to purple, with darker veins, bearded. Mericarps glabrous or pubescent, strongly reticulate; dorsal face flat; angles sharp, but not winged. $2n = 42$. Fl. 2-5.

Arid rocky places, fields and roadsides. Malta and Gozo: very common everywhere (S. & C.G.; Borg; G. Lanfranco; Haslam; Wolseley; Kramer & Westra).

Throughout most of Europe; N. Africa; Asia.

M. nicaeensis All.

Hobbejza mitfija
Southern Mallow

Differs from *M. sylvestris* as follows; annual or biennial; leaves semicircular in outline, scarcely cordate; sepals usually glabrous beneath; petals 10-12 mm. long, pale lilac without darker veins, glabrous or nearly so. Fl. 3-7.

Waste places and roadsides. Malta and Gozo: common (S. & C.G.; Borg; G. Lanfranco).

Mediterranean region; W. and C. Asia; introduced in C. and W. Europe.

4. *M. parviflora* L.

Hobbejża tal-warda zghira
Least Mallow

Glabrous or pubescent annual; stems 20-50 cm. high, erect, with ascending branches. Leaves long-petiolate, suborbicular-cordate, mostly with 5-7, deltate, crenate lobes. Flowers in groups of 2-4; fruiting pedicels mostly less than 10 mm. long. Epicalyx-segments linear to lanceolate; sepals orbicular-deltate, with short cilia or none, strongly accrescent, patent, scarious in fruit; petals 4-5 mm. long, slightly exceeding the sepals, pale lilac-blue, glabrous; staminal tube subglabrous. Mericarps glabrous or pubescent; dorsal face strongly reticulate; angles slightly winged. Fl. 3-6.

Fields and roadsides. *Malta*, *Gozo* and *Comino*: common (S. & C.G.; Borg; G. Lanfranco).

Mediterranean region; S.W. Europe.

3. *Lavatera* L.

Herbs or soft-wooded shrubs usually stellate-pubescent. Flowers solitary or in clusters in the leaf-axils. Epicalyx segments 3, more or less united at the base, at least in bud. Petals emarginate. Stigmas lateral, filiform. Fruit a schizocarp, mericarps numerous, 1-seeded, usually indehiscent, arranged in a single whorl.

1. Flowers solitary in leaf axils
- Flowers in clusters

3. trimestris
- 2

2. Stems herbaceous; epicalyx segments shorter than sepals
- Stems woody in the lower part; epicalyx segments longer than sepals

1. cretica
2. arborea

1. *L. cretica* L.

Cornish Mallow

Annual or biennial, stellate-pubescent to slightly hispid. Leaves up to 20 cm. long, suborbicular-cordate, with 5-7, short lobes. Flowers in clusters of 2-8; pedicels unequal, shorter than the subtending petiole. Epicalyx-segments c. 6 mm. long, free nearly to the base, ovate; sepals c. 8 mm. long, triangular-ovate, acuminate; petals 10-20 mm. long, lilac. Mericarps 7-9(-11), smooth or slightly ridged; angles rounded. Fl. 2-5.

Cultivated and waste places. *Malta*: very frequent (S. & C.G.; Borg; Wolseley). *Gozo*: frequent near Ghajnsielem and Xewkija, rare elsewhere (Borg). *Comino*: (Borg).

Mediterranean region; W. Europe; Atlantic Islands.

2. *L. arborea* L.

Plate XXV

Hobbejża tas-sigra
Tree Mallow

Biennial up to 3 m. high, woody at the base; younger parts stellate-tomentose. Leaves up to 20 cm. long, orbicular, shortly 5- to 7-lobed. Flowers in clusters of 2-7; pedicels 1-2.5 cm. long, shorter than the subtending petiole. Epicalyx segments 8-10 mm. long, suborbicular to ovate-oblong, obtuse, longer than the sepals, strongly accrescent, patent in fruit; sepals c. 4 mm. long, triangular, acute, connivent in fruit; petals 15-20 mm. long, lilac with purple veins and base. Mericarps 6-8, glabrous or tomentose; dorsal and lateral faces ridged; angles sharp. Fl. 3-6.

Rocky coasts, cultivated and waste places. *Malta*: locally frequent (G. Lanfranco), as at Żurriq, Floriana, Wied Inċita, Mdina (S. & C.G.; Borg; Wolseley); Wied Qirda, Birżebbuġia (Borg); Marfa (Wolseley). *Gozo*: Mgarr (S. & C.G.; Borg).

Wolseley); Ghajnsielem, Xlendi, Xaghra (Borg; Wolseley); Mgarr ix-Xini (Wolseley).

Mediterranean region; W. coast of Europe; Atlantic Islands.

1. *L. trimestris* L.

Annual Mallow

Annual; stems up to 120 cm. high, erect or ascending, more or less strigose, with simple or few-rayed deflexed hairs. Leaves 3-6 x 2.5-7 cm., suborbicular-cordate, the upper somewhat 3- to 7-lobed. Flowers solitary in the leaf-axils; sepals usually exceeding the subtending petiole. Epicalyx-segments shorter than the sepals, accrescent, united for most of their length, the free part broadly ovate, cuspidate; sepals 9-14 mm. long, oblong-lanceolate, acute, connivent in fruit; petals 2-4.5 mm. long, bright pink. Mericarps c. 12, glabrous, ridged, covered by a disc-like expansion of the central axis; dorsal face rounded. Fl. 4-7.

Rocky and cultivated places in the valleys. *Malta*: local (G. Lanfranco), as at Żurriq, Wied Qirda, Gnejna, Buskett, Pwales, Għirgenti (S. & C.G.; Borg); Ghajnsielem, Hemisja (Borg); Mdina (Zerafa); Għnien il-Kbira (GD). *Gozo*: Żebbuġ, Mgarr ix-Xini, Pergla (Gulia; Borg).

Mediterranean region.

4. *Aithaea* L.

Herbs. Flowers rather small, usually distinctly pedunculate or pedicellate in racemes or panicles. Epicalyx-segments 6-9, united at the base. Petals obovate, acute or emarginate. Staminal tube terete, hairy. Stigmas lateral, filiform. Mericarps indehiscent, arranged in a single whorl, unilocular, 1-seeded.

Annual; indumentum of simple and stellate hairs; anthers yellow 1. *hirsuta*
Biennial; indumentum of stellate hairs only; anthers purplish-red 2. *officinalis*

1. *A. hirsuta* L.

Hobbejża sufja
Hispid Marsh-mallow

Annual up to 60 cm. high, with numerous, stiff, simple and some stellate hairs. Leaves suborbicular, cordate, crenate or dentate towards base of stem, becoming progressively more deeply lobed upwards; upper cauline leaves pinnately 3- to 5-lobed; lobes linear, dentate or serrate. Stipules entire. Flowers solitary; pedicels longer than the subtending leaves. Epicalyx-segments lanceolate, acuminate, nearly as long as the calyx. Sepals lanceolate or ovate, long-acuminate, free in fruit. Petals c. 15 mm. long, scarcely exceeding the sepals, pinkish-lilac. Anthers yellow. Mericarps glabrous, transversely rugose, with a fine longitudinal line on the dorsal face. Fl. 3-5.

Rocky places. *Malta*: rare (G. Lanfranco), as at Wied Inċita, Gnejna (S. & C.G.; Borg); Pwales, Marfa, Ghajnsielem (Borg); Għar il-Kbir, Żebbuġ (Wolseley). *Gozo*: Wied ir-Riħan, Wied Bingemma (S. & C.G.; Borg); Pergla (Gulia; Borg); Qala (Duthie); Xaghra, Nadur (Borg). *Comino*: frequent (S. & C.G.; Borg). *San Pietro*: (Duthie).

Mediterranean regions; W. Asia.

2. *A. officinalis* L.

Marsh-mallow

Densely-grey-pubescent perennial up to 200 cm. high; all hairs stellate. Leaves triangular-ovate, acute, crenate-serrate, undivided or palmately lobed, often

somewhat plicate. Flowers solitary or clustered in axillary and terminal inflorescences; peduncle of axillary inflorescences shorter than the subtending leaf. Epicalyx segments linear-lanceolate. Sepals ovate, acute, curved over the fruit. Petals 15-20 mm. long, very pale lilac-pink, rarely deeper pink. Anthers purplish-red. Mericarps more or less densely covered with stellate hairs, smooth. $2n = 42$. Fl. 5.

Gozo: Xlendi Valley (Gulia; Borg).

Most of Europe; N. Africa; W. Asia.

5. *Alcea* L.

Tall perennials with erect stems. Flowers large; subsessile in terminal spike-like racemes. Epicalyx segments 6-7, united at the base, smaller than the sepals or about equalling them. Petals emarginate. Staminal tube 5-angled, glabrous. Stigmas lateral, filiform. Carpels 18-40. Fruit a schizocarp; mericarps indehiscent, arranged in a single whorl, hairy at least in centre of dorsal face, each divided by an internal septum into an upper empty cell and a lower one with a single seed.

Bastun ta' San Guzepp
Hollyhock

1. *A. rosea* L.

Stems glabrescent or sparsely setose with deflexed hairs, tomentose-pubescent only on the younger parts. Leaves cordate-orbicular to rhombic, weakly 3-lobed, slightly scabrid-setulose. Epicalyx-segments deltate to triangular-lanceolate, $\frac{1}{2}$ - $\frac{3}{4}$ as long as the subacute, triangular sepals. Petals 30-50 mm. long, contiguous, usually pink but sometimes white or violet. Mericarps 7 mm. long, dorsal face with deep, narrow furrow; angles rugose, produced into parallel wing. Lateral faces appressed-setose. Fl. 4-6.

Malta: Cultivated and often naturalized in old gardens (Borg).

Not known anywhere as an indigenous plant, probably a hybrid of *A. setosa* (Boiss.) Ald. with *A. pallida* (Willd.) Walld. & Klt. or with an Asiatic species.

6. *Abutilon* Miller

Herbs, shrubs or small trees. Epicalyx absent. Stigmas terminal, capitate. Fruit a schizocarp; mericarps arranged in a single whorl, each with several seeds, usually dehiscent *in situ* and not separating readily from the central axis.

Plate XXV

1. *A. theophrasti* Medicus *A. avicennae* Gaertner

Erect annual 50-100 cm. high, the youngest parts tomentose, the older pubescent with simple and stellate hairs. Leaves up to 15 cm. long, long-petioled, cordate-orbicular, acuminate, slightly crenate. Flowers in small cymes in axils of upper leaves; peduncles shorter than petioles. Sepals united in lower half, petals 7-13 mm. long, yellow. Sepals united in lower half; petals 7-13 mm. long, yellow. Mericarps c. 13, exceeding the calyx, black, hirsute, with a slender, erect, patent beak. Seeds finely tuberculate. Fl. 7-11.

Malta: naturalised on the fortifications of Valletta and Floriana, and often found in old gardens (Borg).

Mediterranean region; S.E. Europe; W. Asia.

7. *Gossypium* L.

Shrubs or woody annuals. Irregularly dotted with black oil-glands. Flowers solitary in the leaf-axils. Epicalyx-segments 3, free, broadly ovate to deltate, cordate. Calyx cupuliform, with 5 short teeth or lobes. Styles united; stigmas terminal, capitate more or less united. Fruit a 3- to 5-locular, loculicidal capsule; seeds numerous, hairy.

The cultivated cottons (which include all the European plants) differ from the wild species in having flattened, twisted ('lint') hairs on the seeds. This character seems to have developed under the influence of human selection. The same influence is responsible for the stabilisation of the annual habit, which is found only in cultivated plants, and which has enabled the cultivation of cotton to be carried on in regions with a cold winter climate.

Teeth of epicalyx-segments usually less than 3 times as long as wide; filaments 1-2 mm. long, more or less equal.

1. *herbaceum*

Teeth of epicalyx-segments usually more than 3 times as long as wide; filaments 4-6 mm. long, the upper longer than the lower.

2. *hirsutum*

G. herbaceum L.

Plate XXV

Qoton Malti
Hairless Cotton

Woody annual 1-1.5 m. high, glabrous or sparsely hairy. Leaves c. 11 x 14 cm. cordate, with 3-7 lobes; lobes c. 5 x 5 cm., ovate-orbicular, usually slightly constricted at the base. Epicalyx-segments 2-2.5 cm. long, broadly deltate-ovate to semicircular, usually at least as wide as long; margin with 6-8, triangular, acute to shortly acuminate teeth, usually less than 3 times as long as wide. Petals yellow with purple claw. Filaments 1-2 mm. long, more or less equal. Capsule 1.5 cm. in diameter, subglobose; shortly beaked. Fl. 7-9.

Malta: and Gozo: cultivated since Phoenician times, but now only in a small area of Gozo.

Probably originated in W. Pakistan, now widely cultivated in temperate and tropical regions.

G. hirsutum L.

Qoton ta' Gallipoli
Hairy Cotton

Differs from *G. herbaceum* in being sometimes hairier; leaf-lobes broadly triangular to lanceolate, seldom constricted at the base and sometimes overlapping; epicalyx-segments c. 4.5 cm. long, triangular-ovate, with marginal, long-acuminate teeth usually more than 3 times as long as wide; petals entirely yellow; filaments 4-6 mm. long, the upper longer than the lower; capsule 4-6 cm. in diameter, ovoid. Fl. 7-9.

Malta: cultivated (Borg) not recently (Wolseley). Gozo: cultivated in some districts (Borg).

Probably originated in Peru; cultivated in temperate and tropical regions.

8. *Hibiscus* L.

Herbs or shrubs. Flowers solitary in leaf-axils. Epicalyx segments 6-13, linear, free, or united only at the base. Calyx persistent in fruit. Petals not emarginate. Styles free above; stigmas large, capitate, with long papillae. Fruit a 5-locular, loculicidal, subglobose, ovoid or shortly conical capsule; seeds reniform, numerous.

1. *H. trionum* L.

Plate XXV

Yellow Hibiscus

Somewhat strigose-hispid annual; stems 10-50 cm. high, erect to decumbent branched. Leaves 4-7 cm. long, divided (except the lowest) more or less to the base into 3(-5) oblong-lanceolate, usually deeply pinnatifid lobes. Epicaly segments 10-13, bearing long, simple hairs. Sepals united for most of their length, with conspicuous, dark purple veins, strongly accrescent, membranous and vesicular in fruit. Petals villous, enclosed in calyx. Fl. 7-9.

Cultivated places, formerly in fields of cotton. *Malta*: Mellieha, Ghajn il-Kbi (Gulia; Borg); illustrated from Argotti gardens plant (Wolseley). *Gozo*: Peret Wied il-Lunzjata (Gulia; Borg).

S.E. and E.C. Europe; W. Asia; introduced elsewhere.

GUTTIFERALES

LII. HYPERICACEAE

Shrubs or herbs, with translucent glands containing essential oils and sometimes red or black glands containing hypericin. Leaves simple, opposite, or rarely in whorls of 3-4. Flowers actinomorphic. Sepals imbricate in bud. Petals free, contorted in bud. Stamens in fascicles or apparently indefinite. Ovary superior. Placentation axile or parietal. Seeds without endosperm.

1. *Hypericum* L.

Flowers hermaphrodite. Sepals (4-)5. Petals (4-5), yellow, sometimes tinged with red. Stamens in 3 or 5 fascicles of (1-)3 to c. 125, sometimes alternating with sterile fascicles (fasciculates), or in 5 irregular groups; fascicles, if 5, antepetalous if 3, one antepetalous and two (larger) anteseptalous. Ovary (2-)3- to 5-locular or partly or completely 1-locular, ovules numerous. Styles (2-)13-15, free, slender. Fruit a septicidal capsule, rarely fleshy and more or less indehiscent.

Glands are designated *marginal* if they protrude sufficiently to interrupt the line or the margin of a leaf, sepals or petals, *intramarginal* if they abut on the margin but do not interrupt its line, *superficial* if they are quite clear of the margin.

In many species the ovary and capsule have glandular streaks or patches on the wall. These are referred to as *vittae* if flat or slightly swollen, and as *vesicles* if conspicuously swollen. Vittae on or near the midrib of a carpel are described as *dorsal*.

1. Plant without red or black glands on leaves, sepals, petals or anthers
Red or black glands present, at least on leaves, sepals or anthers
2. Sepals with marginal or intramarginal black glands
Sepals without marginal or intramarginal black glands
3. Leaves hairy on both sides
Leaves glabrous and smooth

1. *aegyptium*

2. *pubescens*

3. *humifusum*

4. Sepals broadly imbricate; flowerless axillary shoots usually absent
Sepals not, or only slightly imbricate; flowerless axillary shoots present

3. *humifusum*

5. Stems with 4 raised lines or wings
Stems with 2 raised lines

4. *tetrapterum*

6. Leaves neither undulate nor amplexicaul; branches of inflorescence ascending
Leaves undulate, amplexicaul; branches of inflorescence patent

5. *perforatum*

6. *triquetrum*

1. *H. aegyptium* L.

Fexflex

Shrubby St. John's wort

Low, spreading shrub. Leaves 3-10 mm. long, elliptical to narrowly oblong, coriaceous, glaucous, often crowned and imbricate. Flowers solitary, sessile or subsessile. Sepals erect, oblong. Petals 8-14 mm. long, persistent. Stamens persistent. Ovary with numerous ovules in each loculus.

Maritime rocks and valleys. *Malta*: common in the south and south-west (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Gozo* and *Comino*: (S. & C.G.; Borg; Wolseley).

Islands and coasts of C. and E. Mediterranean region.

2. *H. pubescens* Boiss.

Fexflex suff.

H. tomentosum auct., non L.

Pubescent St. John's wort

Stems 10-90 cm. high, decumbent, rooting at the base, tomentose. Leaves 5-22 mm. long, oblong to ovate, hirsute to tomentose or crispate-pubescent. Inflorescence corymbose to cylindrical, becoming elongate-monochasial, tomentose or crispate-pubescent. Bracts not auriculate. Sepals 5-10 mm. long, lanceolate, aristate, hirsute or tomentose, shortly glandular-ciliate and usually with sessile marginal black glands, without an apical gland. Petals 9-15 mm. long, with marginal black glands. Fl. 4-7.

Rocky places, roadsides and waste places. *Malta*, *Gozo* and *Comino*: common (Borg; G. Lanfranco; Wolseley).

S. Portugal; S. Spain; Sicily.

3. *H. humifusum* L.

Trailing St. John's wort

Stems 3-30(-40) cm. high, decumbent or procumbent, branching and rooting at the base. Leaves 3-15(-20) mm. long, patent or ascending, usually with translucent dots, the upper oblong to lanceolate, the lower obovate to oblanceolate. Sepals ovate to lanceolate, unequal, entire or with sessile marginal glands or black glandular-ciliate or denticulate, usually with a few superficial black dots. Petals equalling or up to twice as long as the sepals, very rarely with superficial black dots. Capsule equalling or slightly exceeding the sepals. $2n = 16$. Fl. 8-11.

Cultivated places. *Malta*: very rare (G. Lanfranco), as at Hark il-Hamim (GD); (Gulia without locality). *Gozo*: (Gulia without locality).

W. and C. Europe; Atlantic Islands.

4. *H. tetrapterum* Fries

Square-stalked St. John's wort

H. quadrangulum L. nom. ambig.

Stems (6-) 10-100 cm. high, erect from a decumbent, rooting base or rarely wholly procumbent, narrowly 4-winged. Leaves (4-)10-35(-40) mm. long, orbicular.

ovate, broadly oblong or broadly elliptical, sessile, with small translucent dots; margin usually plane. Sepals lanceolate or narrowly oblong, acute or acuminate, entire, sometimes with 1-2(-4) marginal black dots; not red-tinged. $2n = 16$. Fl. 4-8. Damp valleys. Gozo: Pergla, Wied il-Lunzjata (Borg).

W., S. and C. Europe; W. Africa; Madeira.

5. *H. perforatum* L.

Perforate St. John's-wort

Stems 10-100 cm. high, erect from a decumbent, rooting base, 2-lined. Leaves (5-)8-20(-35) mm. long, ovate to linear, sessile or subsessile, with obscurely reticulate venation and with numerous large translucent dots. Sepals lanceolate or oblong to linear, acute to acuminate or shortly aristate, usually entire, without or with a few superficial black dots. Petals with a few marginal black dots, sometimes also with superficial black dots or streaks. Capsule with dorsal vittae and lateral, oblique vittae or vesicles. $2n = 32$. Fl. 4-6.

Arid places. Malta: rare at Kordin (Borg).

Throughout Europe except the extreme north; W. Asia; N. Africa; Atlantic Islands.

6. *H. triquetrifolium* Turra

Plate XXVI

Fexfex tar-raba

H. crispum L.

Triangular-leaved St. John's-wort

Stems 13-55 cm. high, erect or decumbent, 2-lined with divaricate branches. Leaves 3-15(-20) mm. long, lanceolate-triangular or rarely ovate-triangular to linear-oblong, amplexicaul, usually without reticulate venation, sometimes with medium to small translucent dots. Petals without black dots or rarely with one intramarginal dot. Capsule with longitudinal vittae or vesicles. Fl. 3-10.

In fields especially after harvest, uncultivated places, and roadsides. Malta and Gozo: common (S. & C.G.; Borg; Haslam; Wolseley). Comino: common (Borg; G. Lanfranco; Wolseley).

E. Mediterranean region; W. Asia; introduced elsewhere.

LIII. VIOLACEAE

Small shrubs or herbs. Leaves alternate, stipulate, usually undivided. Flowers hermaphrodite, solitary. Sepals 5, persistent. Petals 5, free. Stamens 5, introrse, connivent round the ovary. Ovary superior, unilocular, with 3 placentas and numerous ovules. Fruit a 3-valved capsule, seeds endospermic.

1. *Viola* L.

Leaves petiolate. Sepals prolonged into short appendages below the point of their insertion; corolla zygomorphic, the lower petal spurred; connectives of stamens with an apical appendage, the lower stamens spurred. Styles thickened above; stigma of various shapes (beaked, bilobed, capitate). Seeds with an elaiosome.

Flowers c. 1.5 cm. in diameter, violet or white

1. *odorata*

Flowers c. 0.5 cm. in diameter, white

2. *parvula*

1. *V. odorata* L.

Plate XXVI

Vjoli

Sweet Violet

Perennial 5-15 cm. high, with leaf-rossette and long, procumbent, rooting stolons. Leaves orbicular-reniform, deeply cordate, widest at about the middle;

petiole long. Stipules ovate, glabrous or sparsely ciliate, shortly glandular-fimbriate. Bracts at or above middle of peduncle. Flowers c. 1.5 cm. in diameter, dark violet or white, fragrant. Sepals ovate, obtuse. Spur c. 6 mm. long, exceeding calycine appendages. Stigmatic beak vertical, its length equalling diameter of style. Capsule pubescent. Fl. 2-4.

Shady places; frequently cultivated. Malta: rare, Mtahleb, Gnejna (S. & C.G.; Borg); Ghajn il-Kbira (G.D.; Borg); Buskett (Borg). Gozo: rare, in the Mgarr valley (Duthie).

Most of Europe; W. Asia; N. Africa; Atlantic Islands.

2. *V. parvula* Tineo

V. tricolor var. *parvula* (Tineo)

Rock Pansy

Annual 2-3(-10) cm. high, villous with long hairs. Leaves 0.5-1.2 cm. long, the lowermost oblong-orbicular, almost entire, the others oblong-spathulate. Stipules deeply lobed. Bracts on upper third of peduncles. Sepals ovate-lanceolate; appendages exceeding the spur. Flowers c. 0.5 cm. in diameter, creamy white; corolla scarcely exceeding calyx. $2n = 10$.

Malta: very rare, Kordin hill (Duthie; Borg); Attard, Lija (Borg).

S. Europe.

LIV. PASSIFLORACEAE

Herbaceous or woody climbers with axillary tendrils. Leaves alternate, usually stipulate. Flowers perigynous, usually hermaphrodite, actinomorphic. Hypanthium cup-shaped. Sepals usually 5, free or connate at base, often petaloid. Petals 5, usually free. Corona inserted on the rim of the hypanthium, composed of 1-2 rows of long filaments, 1 row of short filaments and a membrane partially closing the hypanthium. Stamens usually 5, alternating with the petals. Ovary superior, often on a long gynophore, unilocular, with 3(-5) parietal placentae; ovules numerous; stigmas 3-5. Fruit a berry or loculicidal capsule.

1. *Passiflora* L.

Flowers hermaphrodite. Stamens connate and adnate to the gynophore. Stigmas 3. Fruit a berry.

1. *P. caerulea* L.

Plate XXVI

Fjur tal-Passjoni
Passion flower

Glabrous and somewhat glaucous climber up to 10 m. high; stems terete or obscurely angled. Leaves 10-15 cm. long, digitately 5(-7)-lobed, the lobes oblong-lanceolate or ovate; petioles with 2-4 glands. Flowers 7-10 cm. in diameter, solitary, axillary on articulated peduncles. Sepals white or pale pink on the inside, with a short horn on the back. Petals white or pale pink. Corona dull purple at the base, white in the middle, purplish-blue at the apex. Stigmas dull purple. Fruit c. 5 cm. in diameter, ovoid or subglobose, orange-yellow.

Malta: frequently cultivated for ornament and often semi-naturalised over old walls (Wolseley).

Native of C. & W. South America, cultivated for ornament elsewhere, particularly in S.E. Europe.

IV. CISTACEAE

Shrubs or herbs. Leaves usually opposite, simple, mostly with stellate indumentum. Flowers hermaphrodite, actinomorphic, hypogynous, solitary or in cymes. Sepals 5 or 3. Petals 5, rarely 0, usually caducous. Stamens numerous. Ovary 1-locular or incompletely septate with 3 or 5 (rarely 10) parietal placentae. Style simple or 0; stigmas 3 or 5. Fruit a loculicidal capsule. Seeds with more or less curved embryo; endosperm present.

Capsule with 5, 6 or 10 valves; flowers white or pink
Capsule with 3 valves; flowers yellow

1. *Cistus*
2. *Fumana*

1. *Cistus* L.

Shrubs. Flowers 2 cm. or more in diameter, white to purplish-red. Ovary usually 5, rarely up to 10-locular; placentation axile, ovules orthotropous, the funicle filiform.

Flowers pink; style filiform
Flowers white; style subsessile

1. *incanus*
2. *monspeliensis*

1. *C. incanus* L.

Plate XXVI

Grey *Cistus*

Stems up to 100 cm. high, erect or spreading. Leaves (10-) 20-50(-70) x 8-30 mm., ovate or elliptical, often undulate, pinnately veined, green or greyish, pubescent or tomentose with stellate hairs, with the veins impressed above and prominent beneath. Petioles 3-15 mm. long. Cymes 1- to 7- flowered, more or less symmetrical. Sepals 5, ovate-lanceolate, long-acuminate, with stellate hairs and long simple hairs. Flowers 4-6 cm. in diameter, purplish-pink. Fl. 3-5.

Two subspecies are recorded. Subsp. *incanus* with the leaves 25-50 x 15-30 mm., flat. Subsp. *creticus* (L.) Heywood with the leaves 15-25 x 8-15 mm., distinctly undulate-crispate.

Arid rocky slopes. *Malta*: Wied Gerżuma, Ta' Baldu, St. Paul's Bay (S. & C.G.; Borg); Gnejna, Wardija (Borg); Pwales (GD; Borg); Wied Hazrun (Wolseley); San Martin, Buskett (Penza); Selmun (Gauci). *Gozo*: Gnien Imrik (S. & C.G.; Borg).

Mediterranean region.

2. *C. monspeliensis* L.

White *Cistus*

Compact bush up to 100 cm. high, erect, viscid. Leaves 15-50 x 4-8 mm., linear-lanceolate or linear, 3-veined, green and sparsely pubescent above, densely stellate-tomentose beneath, sessile. Cymes 2- to 8- flowered, unilateral. Sepals 5, the outer ovate, broadly cuneate at base. Flowers 2-3 cm. in diameter, white. Styles very short. $2n = 18$. Fl. 3-5.

Arid rocky slopes. *Gozo*: very rare, frequent at Nadur, between Wied ir-Rihan and Wied Bingemma (S. & C.G.; Borg; Gauci).

Mediterranean region; Atlantic Islands.

2. *Fumana* (Dunal) Spach

Dwarf shrubs. Leaves narrow, ovate-lanceolate to linear, acicular, alternate (rarely opposite), stipulate to exstipulate. The two outer sepals small, the three inner large, scarious, prominently veined. Petals yellow. Outer stamens sterile, monik

form. Style filiform, more or less geniculate at base. Capsule 3-veined, the valves usually patent after dehiscence.

Leaves alternate, more or less equally spaced on the stem, not or scarcely reduced above

1. *arabica*

Leaves opposite below, unequally spaced on the stem, more or less abruptly reduced above to form small bracts in the inflorescence

2. *thymifolia*

1. *F. arabica* (L.) Spach

Mediterranean Rock rose

Helianthemum arabicum (L.) Pers.

Much-branched, laxly caespitose, up to 35 cm. high. Leaves 6-12 x 0.8-5 mm., alternate, ovate to oblong-lanceolate, acute, flat, glandular-pubescent to glabrescent; stipules short. Flowers 1-7, forming a distinct, lax, inflorescence. Capsules (6-) 8- to 12- seeded; seeds reticulate-foveolate. Fl. 3-5.

Arid, rocky places. *Malta*: local (G. Lanfranco), as at St. Paul's Bay, Mellieha, St. George's (S. & C.G.; Borg); Hagar Qim, Marfa (S. & C.G.; Borg; Haslam; Wolseley); Nadur (Wolseley); Wardija ridge (Gauci). *Gozo*: between Wied ir-Rihan and Wied Bingemma (S. & C.G.; Borg; Wolseley); Pergla (Wolseley).

Mediterranean region.

2. *F. thymifolia* (L.) Spach ex Webb

Plate XXVI

Thyme Rock-rose

Helianthemum thymifolium (L.) Pers.

Up to 20 cm. high; stems erect or ascending. Leaves 5-13 x 0.5-1 mm., opposite at least below, linear, linear-lanceolate or narrowly elliptical, obtuse or mucronate, glabrous, pubescent or glandular-pubescent, with strongly revolute margins, stipulate, with small, leafy, axillary shoots. Inflorescence 2- to 9- flowered; pedicels much longer than the subtending bracts. Capsule (4-) 6-seeded. $2n = 32$. Fl. 3-5.

Rocky arid places. *Malta*: locally abundant as at Pwales (S. & C.G.; Borg); Ta' Gholja, Ta' Lawrenti (Borg); Buskett, St. Paul's Bay, Mtaħleb (S. & C.G.; Borg; Wolseley); Marfa (Borg; Haslam); Dingli, Nadur, Mistra, Ghar il-Kbir (Wolseley); Mellieha (Kramer & Westra); Wardija ridge (Gauci). *Gozo*: Ta' Ġenċ, Mgarr ix-Xini (S. & C.G.; Wolseley); Wied ir-Rihan, Wied Bingemma (S. & C.G.; Borg; Wolseley); towards Qala, San Blas (Duthie; S. & C.G.; Borg; Wolseley); Nadur (Borg; Wolseley).

Mediterranean region.

LVI. TAMARICACEAE

Shrubs or small trees. Leaves simple, alternate, exstipulate, usually ericoid. Flowers solitary or in spike-like racemes, hermaphrodite, actinomorphic. Sepals 4-5, free or slightly united at the base; petals 4-5, free; stamens 4 to numerous, free or partly united. Ovary superior, of 3-5 carpels; placentation parietal. Fruit a septicidal capsule; seeds numerous, with numerous long, unicellular hairs.

1. *Tamarix* L.

Leaves small, scale-like, amplexicaul or sheathing, with immersed salt-secreting glands. Flowers small, white or pink, in spike-like racemes, which may be borne on the growth of the current year, or of previous years, or both. Sepals and petals 4-5. Stamens 4-15, of which 4-5 are antesealous and 0-10 antepetalous;

anthers extrorse. In the species without antepetalous stamens there is a more or less fleshy, nectar-secreting, 4- to 5-lobed disc between stamens and ovary. Styles 3-4, short. Seed with a sessile tuft of hairs.

Petals 2-3 mm long, at least some of them persistent
Petals 1.25-2 mm long, caducous

1. *africana*
2. *gallica*

1. *T. africana* Poiret

Plate XXVI

Bruka
African Tamarisk

Tree with black or dark purple bark, glabrous except for papillose bracts and inflorescence-axis. Leaves 1.5-4 mm. long, acute. Racemes 30-60 x 5-8 mm., usually vernal, sometimes aestival. Bracts triangular, obtuse to acuminate, usually exceeding the calyx. Flowers white or pink, 5-merous, without the antepetalous stamens. Sepals 1.5 mm. long. Petals 2-3 mm. long, trullate-ovate. Filaments expanded at the base and confluent with lobes at the disc.

Coastal areas. *Malta*: Wied il-Baruni in Marsascala (Gulia; Borg); Bahrija (Borg; Wolseley); Ghadira, Golden Bay (Wolseley). *Gozo*: between Wied ir-Rihan and Wied Bingemma; Ramla (S. & C.G.; Borg; Wolseley); Wied Qasab, Dabket Qorrot (Gulia; Borg); San Blas (Gulia; Wolseley); Mgarr ix-Xini, Fergla (Wolseley).

W. and C. Mediterranean region.

2. *T. gallica* L.

Common Tamarisk

Shrub or bushy tree, entirely glabrous with dark brown to dark purple bark. Leaves 1-3 mm. long. Racemes 15-45 x 3-5 mm., rather lax, usually aestival, forming panicles. Bracts linear to triangular, more or less erose-denticulate, not exceeding the calyx. Pedicel equalling the calyx. Flowers pink, 5-merous without antepetalous stamens. Sepals 0.75-1.25 mm. long, entire. Petals 15-2 mm. long, elliptical to elliptic-obovate. Filaments as in *T. africana* but disc smaller, less fleshy. Fl. 4-6.

Malta: commonly planted as at St. Julian's down to Qni-si-Sana, Msida and Kalkara (Valletta); St. Paul's Bay (Wolseley). *Gozo*: Xlendi (Valletta); Marsalforn (Borg). *Comino*: St. Mary's Bay (Valletta; Wolseley).

W. Mediterranean region; Atlantic Islands; cultivated elsewhere.

LVI. FRANKENIACEAE

Herbs or dwarf shrubs. Leaves opposite, entire, often ericoid; stipules absent. Flowers usually hermaphrodite. Sepals 4-6, connate for more than half their length. Petals 4-6, clawed, with a scale-like appendage on the claw. Stamens usually 6, in 2 whorls. Ovary superior, fertile only in the lower half, 1-locular. Seeds endospermous.

1. *Frankenia* L.

Annual or perennial. Flowers sessile, solitary or in leafy cymes or spikes. Petals and sepals usually 5; calyx tubular, persistent; petals imbricate. Outer whorl of stamens shorter than the inner. Ovary sessile, of 3(-4) carpels; ripe capsule enclosed in calyx.

1. Annual; leaves obovate or oblong-spathulate, usually plane
- Perennial, woody at base; leaves with revolute margins, appearing linear or linear-lanceolate

1. *pulverulenta*

2.

2. Flowers scattered throughout the upper parts of the stems and branches, not confined to terminal corymbiform clusters.
- Flowers confined to dense corymbiform clusters which are terminal on the main stems or branches

2. *laevis*

3. *hirsuta*

1. *F. pulverulenta* L.

Annual Sea-heath

Annual; stems up to 30 cm. high, procumbent, often mat-forming, rarely erect, sparsely or densely puberulent. Leaves 1.5(-3) x 0.5-4 mm., obovate to oblong-spathulate, usually plane, glabrous or sparsely puberulent above, densely puberulent beneath, without a white crust. Flowers crowded, secund, in short terminal and axillary spikes. Calyx 2.5-4 mm. long, puberulent or subglabrous. Petals 3.5-5 mm. long, oblong to obovate, pale or deep violet. Fl. 3-7.

Maritime rocks and sands. *Malta*, *Gozo* and *Comino*: common (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Cominotto*: (Duthie; Borg). *Filfa*: (S. & C.G.; Borg).

Mediterranean region; W. Asia; Atlantic Islands.

2. *F. laevis* L.

Plate XXVI

Sea-heath

Perennial; stems up to 40 cm. high, procumbent, much-branched, mat-forming, sparsely or densely puberulent with hairs up to 0.1 (-0.2) mm. long. Leaves 2-5 mm. long, glabrous or subglabrous above; puberulent beneath, sometimes covered by a white crust; margins revolute. Flowers solitary or in small clusters throughout the upper parts of the main stems and branches, not confined to terminal corymbiform clusters. Calyx 3-4(-5) mm. long, subglabrous, or puberulent, with hairs up to 0.2 mm. long in the lower part. Petals 4-6 mm. long, purplish or whitish. Fl. 3-7.

Maritime rocks and sands. *Malta*, *Gozo* and *Comino*: common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

W. Europe; W. Mediterranean region; Atlantic Islands.

3. *F. hirsuta* L.

Hairy Sea-heath

F. laevis var. *hirsuta* (L.) Flori

Perennial; stems up to 40 cm. long, procumbent, much branched, mat-forming, densely puberulent or pubescent at least near apex, with hairs 0.1-1 mm. long. Leaves 2-8 mm. long, glabrous to puberulent above, puberulent beneath, without a white crust but sometimes with a powdery covering; margins revolute, or rarely some leaves plane. Flowers confined to conspicuous, dense, corymbiform clusters terminal on the main stems and branches. Calyx 3.5-5 mm. long, sparsely puberulent to densely pubescent with hairs up to 0.5 mm. long. Petals 4-6 mm. long, pale purplish or white.

Maritime rocks and sands. *Malta*, *Gozo*, *Comino*, *Cominotto* and *Filfa*: common with *F. laevis* (Borg).

S. E. Europe; Mediterranean region.

LVIII. ELATINACEAE

Aquatic or marsh herbs. Leaves simple, opposite or whorled, stipulate. Flowers hermaphrodite, actinomorphic, hypogynous, 2- to 5-merous; solitary or in cymes. Sepals free or connate at base, as many as petals. Ovary superior, 2- to 5-locular; styles free; ovules numerous; placentation axile. Fruit a septicidal capsule.

1. *Elatine* L.

Herbs of wet places. Leaves entire. Sepals 3 or 4, membranous, patent in terrestrial plants, closely investing ovary or occasionally absent in aquatic plants. Capsule more or less globose. Seeds straight or curved.

1. *E. macropoda* Guss.

Plate XXVI

Southern Waterwort

E. hydropiper var. *macropoda* (Guss.) Flori

Annual, 2-16 cm. high. Leaves opposite. Flowers with distinct pedicel up to 23 mm. long. Sepals 4, much longer than mature capsule; petals 4, ovate, pale red, shorter than sepals; anthers 8; carpels 4. Capsule globose or depressed. Seeds almost straight or asymmetrically horseshoe-shaped, with long arm 2-2.5 times as long as short arm; reticulations on testa usually hexagonal at base of seed.

In winter-wet depressions on the rocky plateaus. *Malta*: Wied Incita, Wied il-Ghasel, Wied Balluta, Minsija, Buskett, Tal-Gholja (Borg). *Gozo*: Xlendi, Ta' Cené (Borg); Munxar (Borg, Wolseley).

W. Mediterranean region and S.W. Europe.

CUCURBITALES

LIX. CUCURBITACEAE

Herbs, often climbing by means of tendrils. Flowers unisexual. Calyx deeply 5(-6)-lobed; corolla deeply 5(-6)-lobed. Stamens 5, sometimes 3 (owing to 4 being connate in pairs); filaments sometimes all connate; anthers with 1 theca, free or coherent. Ovary inferior, unilocular but often more or less divided by the 2-5 placentae; style usually 1, with 3, usually divided stigmas. Ovules 1 to many. Fruit usually fleshy and indurated.

1. *Echallium* A. Richard

Monoecious. Perennial hispid herb with a tuberous root. Stems procumbent, with tendrils. Calyx shortly campanulate, 5-fid; corolla almost rotate, 5-fid. Male flowers in axillary racemes; stamens 3. Female flowers solitary, axillary; staminodes 5, 4, connate in pairs. Seeds numerous.

1. *E. elaterium* (L.) A. Richards

Plate XXVII

Faqus il-Amir
Squirting Cucumber

Stems 15-60 cm. high. Leaves long-petiolate; lamina 4-10 cm. long, cordate to triangular, entire, denticulate or rarely shallowly lobed, undulate, rather fleshy. Corolla of male flowers 18-20 mm. long, yellowish. Fruit 4.5 x 2.5 cm., green, ovoid, very hispid, dehiscing explosively at the base. Flowers throughout year. *Malta*, *Gozo*, *Comino* and *Filfa*; very common (Borg; G. Lanfranco; Wolseley). Mediterranean region.

LX. CACTACEAE

Perennial, succulent plants; stems columnar, cylindrical or flattened, often jointed (the individual segments being referred to as joints). Leaves absent or small, subulate, caducous. Branches, spines, flowers and sometimes barbed bristles (glochids) developed from more or less circular, cushion-like structures (areoles) situated in leaf-axils when leaves are present. Flowers hermaphrodite, solitary, sessile. Perianth with tube; sepals numerous and intergrading with petals, all imbricate in several rows. Stamens numerous; filaments inserted on perianth-throat. Style 1 stigma 2 to many. Ovary inferior, 1-celled; placentae 3 or more, parietal; ovules numerous. Fruit a berry, often spiny or glochidiate, usually many-seeded.

1. *Opuntia* Miller

Somewhat woody; stems with short cylindrical or flattened, often tuberculate joints. Leaves small, subulate, caducous. Areoles bearing many glochids and usually longer stouter spines. Ovary spiny or spineless. Seeds hard, pale, more or less discoid or angular.

1. *O. ficus-indica* (L.) Miller

Plate XXVI

Bajtar tax-Xewk
Bajtar ta' Gindja
Franciž
Ingliž
Isfar
Prickly Pear

Erect, 3-5 m. high, with patent branches; joints 20-50 x 10-20 cm., oblong to spatulate-oblong. Leaves 3 mm. long, subulate; areoles small, whitish; spines usually 0, rarely 1-2, small, pale yellow or white; glochids yellow, numerous, caducous. Flowers 7-10 cm. in diameter, bright yellow; filaments pale yellow. Fruit 5-9 cm. long, ovoid or obovoid, with strongly depressed umbilicus, yellow, red or parti-coloured, edible. Fl. 5-7.

Cultivated on a large scale for its fruits and as a windbreak. *Malta*, *Gozo* and *Comino*: frequent (G. Lanfranco); probably widely naturalised but often also as a relic of cultivation (Borg; Wolseley; Haslam).

Native of Tropical America, but widely cultivated and naturalised elsewhere.

O. maxima (L.) Miller with brownish glochids and fruit with a flat umbilicus is cultivated for its red fruits used in colouring food stuff (Borg).

MYRTALES

LXI. LYTHRACEAE

Herbs (non-European genera include trees and shrubs). Leaves simple, entire; stipules minute or absent. Flowers hermaphrodite, regular, perigynous, 4- to 6-merous, solitary or in small cymes or clusters in the leaf-axils, rarely in terminal spikes. Hypanthium pelviform to cylindrical. Epicalyx often present. Petals free, pink or purple, inserted on lip of hypanthium; sometimes 0. Stamens 2-12, inserted on tube of hypanthium. Ovary superior, 2- or 4-locular; style single; stigma capitate. Fruit a capsule; seeds numerous.

1. *Lythrum* L.

Annual or perennial; leaves alternate, opposite or whorled. Flowers usually 6-merous (sometimes 4 or 5-merous); usually solitary in the leaf-axils, sometimes in pairs or in small, whorl-like cymes, which may form terminal spikes; each flower shortly pedicelate, with 2 bracteoles. Hypanthium usually tubular, sometimes short and wide. Epicalyx present. Petals usually present. Stamens 2-12. Capsule usually septicidally dehiscent with 2 valves, rarely dehiscing irregularly or by 4 apical teeth.

In some species the flowers are trimorphically heterostylous, with the stamens in two series of different length, and the stigma at a level below the anthers of both series, or above them both, or between the two.

Flowers trimorphically heterostylous; stamens 12, at least some of them exerted

Flowers homostylous; stamens usually 4-6, included

1. *juncum*

2. *hyssopifolia*

1. *L. junceum* Banks & Solander
L. graefferi Ten.

Plate XXVII

Creeping Loosetrife

Glabrous, usually perennial; stem usually branched from the base with decumbent, divaricate, straggling branches 20-70 cm. long. Leaves 8-22 x 2-11 mm., broadly elliptic-oblong to linear-oblong, mostly alternate. Flowers trimorphic, solitary in the leaf-axils, suberect. Hypanthium 5-6 mm. long, shorter than the subtending leaf, cylindrical-obconical, tapered gradually to the base. Sepals broadly deltate, scarious, epicalyx-segments c. 1 mm. long, triangular-subulate, equalling or somewhat exceeding the sepals. Petals 5-6 mm. long, purple, sometimes white or cream at the base. Stamens 12, some or all exserted. Capsule much shorter than the hypanthium. Fl. 4-6.

Along winter-wet water-courses and damp places. *Malta*: locally frequent (G. Lanfranco), as at Ghajn Rihana, Gnejna, Wardija, Mthaleb, Fiddien (Borg; Wolseley); Wied Mula, Pwales, Wied Gerzuma (Borg); Chadwick Lakes; Wied Gannotta (Gauci). *Gozo*: Wied il-Lunzjata (Borg).

Mediterranean region; Atlantic Islands.

Grass-Poly

2. *L. hyssopifolia* L.

Annual with erect or ascending branches, more or less glabrous. Leaves up to 25 x 8 mm., but usually much less, alternate, usually suberect, linear to oblong. Flowers numerous, erect and appressed, (5-)6-merous, homostylous. Hypanthium 4-6 mm. long, obconical in flower, cylindrical in fruit. Epicalyx-segments 1-1.5 mm. long, subulate, about twice as long as the hypanthium; style 1.3-2 mm. long. Fl. 4-5.

In valleys and pools on the coralline plateau. *Malta* and *Gozo*: locally frequent (S. & C.G.; Borg; Haslam; G. Lanfranco; Wolseley).

Europe, except the north; W. Asia; Africa; America; Australia.

LXII. MYRTACEAE

Evergreen trees or shrubs. Leaves simple, usually opposite, exstipulate, with aromatic oil-glands. Flowers hermaphrodite, actinomorphic. Calyx and corolla 4- or 5-merous. Stamens numerous. Ovary inferior, syncarpous, with axile placentation; fruit a berry or capsule.

Shrub: leaves opposite; fruit a berry
Trees: leaves on adult shoot alternate; fruit a woody capsule

1. *Myrtus*
2. *Eucalyptus*

1. *Myrtus* L.

Shrub with simple, opposite leaves. Flowers solitary in leaf-axils. Fruit a berry crowned by the persistent calyx-teeth.

1. *M. communis* L.

Plate XXVII

Rihan
Myrtle

Erect, much-branched shrub, up to 5 m. high. Twigs glandular-hairy when young. Leaves up to 5 cm. long, ovate-lanceolate, acute, entire, coriaceous, punctate, very aromatic when crushed. Flowers up to 3 cm. in diameter, sweet-scented. Pedicels long, slender, with 2 small, caduceous bracteoles. Petals suborbicular, white. Berry 7-10 x 6-8 mm., broadly ellipsoid to subglobose, usually blue-black when ripe. Fl. 6-7.

Malta: rare at Wardija (S. & C.G.; Gauci); Addolorata (S. & C.G.); Wied Gerzuma (S. & C.G.; Borg); San Martin (GD.); Mellieha (Duthie); Wied Harun, Buskett (Borg); Girgenti (Gauci).

Mediterranean region and W. Asia, but widely cultivated since ancient times; the native range is therefore very uncertain.

2. *Eucalyptus* L'Hér.

Trees with persistent or deciduous, smooth or fibrous bark. Leaves dimorphic; juvenile leaves opposite, sessile or shortly petiolate, often glaucous, frequently produced on mature trees in response to wounding; mature leaves alternate, petiolate, pendulous, tough, rigid, with a prominent intramarginal vein. Flowers in umbels or solitary, closed in bud by the connate perianth segments forming a hemispherical or conical operculum which falls off when the flower opens. Fruit a capsule, opening by valves which are described as exserted when they project beyond the rim of the capsule and enclosed when they remain below the rim.

1. *E. amygdalinus* Labil.
- E. longifolius* auct.

Ewkaliptus
Narrow-leaved Eucalyptus

Small to moderate-sized tree. Leaves linear to broadly lanceolate, acuminate, entire. Umbels 4 to 8-flowered; peduncles terete. Operculum hemispherical. Fruit subglobose-truncate; valves enclosed or slightly protruding.

Malta: planted, Mosta Road, Public Garden at Gżira, Floriana and Main Street, St. Julian's; Targa Gap, Burmarrad, Luqa (Wolseley).

Native of Australia.

LXIII. PUNICACEAE

Leaves not gland-dotted. Flowers perigynous. Sepals 5-7, valvate, persistent. Petals 5-7, imbricate and crumpled in bud. Ovary inferior, multi-locular; loculi superposed, the lower ones with axils, the upper ones with parietal placentation; styles simple; ovules numerous. Fruit berry-like, with coriaceous exocarp and numerous seeds each surrounded by pulp.

1. *Punica* L.

Shrub or tree, sometimes spiny; twigs 4-angled. Leaves opposite; deciduous; stipules absent. Flowers hermaphrodite, terminal.

1. *P. granatum* L.

Plate XXVII

Rumien
Pomegranate

Spiny shrub or small tree. Leaves oblong-lanceolate to obovate, glabrous, entire. Flowers 30-40 mm. in diameter. Hypanthium coriaceous, reddish. Petals red, rarely white. Fruit 5-8 cm. in diameter, reddish-brown; pulp surrounding seeds translucent, purple, yellowish or white, acid or sweet. Fl. 5-7.

Cultivated for its fruit and widely naturalised on rocky slopes in valleys and elsewhere. *Malta* and *Gozo*: common (S. & C.G.; Borg; Wolseley). *Comino*: (Wolseley).

Native of S.W. Asia; widely cultivated in the Mediterranean region.

LXIV. ONAGRACEAE (GENOTHERACEAE)

Herbs or shrubs. Flowers hermaphrodite, actinomorphic or weakly zygomorphic. Hypanthium ("calyx-tube") often present. Sepals 2, 4 or 5, petals 0, 2, 4 or 5. Stamens 2 or 4 in 1 whorl, or 8 or 10 in 2 whorls; pollen connected in masses by viscous threads. Style 1; ovary 1-, 2-, 4- or 5-locular. Fruit a capsule, a berry or dry and indehiscent. Seeds without endosperm.

1. *Epilobium* L.

Perennial herbs, often flowering in the first year, overwintering by turions or rosettes, which persist about the base of the previous year's stem, or by stolons. Leaves alternate, opposite, or verticillate. Flowers actinomorphic or weakly zygomorphic, small to medium-sized, in a leafy raceme or spike, or axillary; hypanthial tube short or absent. Sepals 4, erect; petals 4, white, pink or purple; stamens 8, in 2 whorls; stigma clavate or capitate and entire, or deeply 4-lobed; ovary 4-locular. Fruit a long and slender, locuticidal capsule; seeds numerous, small, with a chalazal plume of hairs (coma).

Stigma 4-lobed
Stigma entire

1. *parviflorum*
2. *tetragonum*

1. *E. parviflorum* Schreber Plate XXVII Hoary Willowherb

Overwintering by rosettes; stems up to 75 cm. high, robust, usually villous. Leaves 2.5-10 x 0.7-3 cm., oblong to linear-lanceolate, subsessile, weakly serrulate. Petals 4-9 mm. long, purplish-pink. Seeds c. 1 mm. in diameter, obovoid. $2n = 36$. Fl. 4-10.

Damp valleys: *Malta*: rare at Mtahleb, Baskett (Borg).

Europe, except the extreme north; N. Africa; W. and C. Asia.

2. *E. tetragonum* L. Square-stalked Willowherb

Overwintering by rosettes; stems 5-110 cm. high, with elevated strigulose lines. Leaves 2.8 x 0.5-2 cm., oblong or oblong-lanceolate, serrulate. Inflorescence greyish-pubescent. Petals purplish-pink. Capsule 5-8 cm. long. Seeds 1-1.5 mm. in diameter, obovoid. Fl. 4-10.

Two subspecies are recorded. Subsp. *tetragonum* has the petals 2.5-7 mm. long and the stigma surrounded by anthers at anthesis. Subsp. *tournesfortii* (Michx.) Leveillé has the petals 7-11.5 mm. long and the stigma usually elevated above the anthers at anthesis.

Damp valleys. *Malta*: infrequent (G. Lanfranco), as at Girgenti, Mtahleb, Fiddien, Bahrija, Onien il-Kbir, San Martin, Gnejna, Wied il-Qlegh, Mellicha (Borg).

Europe except the extreme north; W. Asia.

LXV. HALORAGACEAE

Herbs with exstipulate leaves. Flowers hermaphrodite or unisexual. Sepals 0, 2 or 4, small. Petals 0, 2 or 4, often caducous. Stamens 2, 4, or 8, epipetalous; anthers basifixed, 2-locular. Ovary inferior, 1- to 4-locular, with 1 pendent, anatropous ovule in each loculus; styles 1-4, usually short; stigmas feathery or coarsely papillose. Fruit a drupe, or a schizocarp separating into 1-seeded nutlets.

1. *Myriophyllum* L.

Glabrous, rhizomatous, aquatic perennial herbs. Leaves in whorls of 3-6, usually pinnatisect with capillary segments. Inflorescence an emergent spike; flowers mostly unisexual, male above, female below. Sepals 0 or 4, caducous in male, inconspicuous or absent in female flowers. Stamens 4, or 8. Ovary 1-locular; stigmas 4, sessile or subsessile. Fruit separating longitudinally into 4 1-seeded nutlets.

1. *M. verticillatum* L.

Plate XXVII

Whorled Water-nutfoil

Stems up to 300 cm. long; perennation by clavate turions. Leaves 25-45 mm. long, (4-15-6) in a whorl, often longer than internodes; segments 24-55. Spike 7-25 cm. long. Flowers usually in whorls of 5; bracts pinnatisect, 1-15 times as long as the flowers. A few hermaphrodite flowers usually present between male and female flowers. Petals 2.5 mm. in male flowers, absent in female. Stamens 8. Fruit c. 3 mm. in diameter, subglobose, smooth. $2n = 28$. Fl. 4-6.

Standing and slow moving water. *Malta*: abundant in a reservoir in the Girgenti valley (Wolsley).

Most of Europe; N. Africa; Asia; N. & S. America.

LXVI. THELIGONACEAE

Flowers unisexual, in axillary 1- to 3-flowered clusters. Perianth present. Male flowers with 7-20 stamens. Female flowers with an inferior, unilocular ovary. Fruit a nut-like drupe. Ovule solitary, basal.

1. *Theligonum* L.

Annual, glabrous and somewhat succulent herbs. Flowers green. Perianth of male flowers globular, splitting into 2-5 lobes at anthesis. Female flowers with a tubular, minutely toothed perianth.

1. *T. cynocrambe* L.

Plate XXVII

Cynocrambe prostrata Gaertner

Habaq il-Bnifer
Dog Cabbage

Foetid, monoecious. Stems 5-30 cm. high, ascending, swollen at nodes. Leaves ovate, entire, petiolate, the lower opposite, the upper alternate; stipules membranous, sheathing. Male flowers with a 2-partite perianth and usually 7-12 stamens; anthers long, narrowly linear. Fruit c. 2 mm. in diameter, ovoid, adnate to the base of the perianth. $2n = 20$. Fl. 12-5.

Walls, rocks and stony places. *Malta*: common (S. & C.G.; Borg; G. Lanfranco; Kramer & Westra; Wolsley). Gozo and Comino: (S. & C.G.; Borg). Mediterranean region; Portugal.

UMBELLIFLORAE

LXVII. ARALIACEAE

Shrubs or woody climbers; leaves alternate. Flowers actinomorphic, small. Calyx small or rudimentary; petals 5, free; stamens 5; ovary inferior. Fruit a berry.

1. *Hedera* L.

Stems woody, climbing or creeping, with numerous adventitious roots. Leaves simple, exstipulate, evergreen. Indumentum of stellate or pellate hairs. Flowers

hermaphrodite, in globose umbels, which may be solitary or grouped in a racemose panicle. Sepals very small, deltate. Ovary 5-celled, surmounted by a conspicuous, domed disc, terminating in a single, short style. Berry globose, with 2-5 rugose, whitish seeds.

1. *H. helix* L.

Plate XXVIII

Liedna
Ivy

Stem up to 30 m., climbing or creeping. Young shoots and inflorescence densely covered with stellate to peltate hairs 0.15-0.4 mm. in diameter; each with (4-) 6-16 (-22) rays. Leaves shining, dark green, dimorphic; those of the flowering shoots (often absent in shady or cold situations) 6-12 x 2-12 cm., narrowly elliptical to suborbicular-cordate, entire; those of the non-flowering shoots up to 15 x 15 cm. but usually much less, palmately (3-) 5-lobed. Petals 3-5 mm. long, yellowish-green, patent, later deflexed. Berry with 2-3 seeds. Fl. 9-11.

Rocks and walls. *Malta* and *Gozo*: frequent in most valleys as at Gnejna, Girgenti, Buskett (S. & C.G.; Borg; Haslam; Wolseley); Addolorata Cemetery and Sa Maison Gardens (Wolseley); and in great quantity on the cliffs at Pergla (Wolseley). *Comino*: (Borg). Cultivated in gardens for ornament, where cultivars differing mainly in size, shape and colour of leaves are known (Borg).

W., C. & S. Europe, northwards to 60° in Norway, and extending eastwards to Latvia and Ukraine; W. Asia.

LXVIII. UMBELLIFERAE

Herbs, rarely shrubs. Leaves alternate; lamina usually large and much-divided; petiole often inflated and sheathing at base. Stipules absent. Inflorescence usually a compound umbel. Flowers epigynous, small, hermaphrodite or unisexual, the plant rarely dioecious. Sepals usually small or absent; petals 5, usually more or less 3-lobed, the middle lobe inflexed; outer petals sometimes much larger than inner (*radiate*); stamens 5; carpels (1-) 2, usually attached to a central axis (*carpophore*), from which the mericarps separate at maturity; styles (1-) 2, often with a thickened base (*stylopodium*); ovule 1 in each loculus, pendulous. Fruit dry; pericarp membranous or exocarp variously indurated; endocarp rarely woody. Mericarps usually joined by a narrow or wide commissure; each mericarp more or less compressed laterally or dorsally, with 5 longitudinal veins, usually with ridges over them, separated by *valleculae* or sometimes with 4 secondary ridges alternating with the primary; resin canals (*vittae*) usually present between the primary ridges and on the commissural face.

In the following account the primary divisions of the leaves are referred to as *segments* and the ultimate divisions, cut nearly or quite to the midrib, as lobes. The lobes may themselves sometimes be deeply lobed. The leaves are never truly pinnate, but are described as pinnate, for brevity, when the lamina is divided to the midrib. Descriptions of umbels refer to the terminal, or other well-developed umbels: lateral umbels are often smaller, with fewer rays, and may be entirely male. Bracts are structures which subtend the primary branches (*rays*) of a compound umbel, and bracteoles are those which subtend the partial umbel, or the whole of a simple umbel. When the *stylopodium* is described, the description refers to the *stylopodium* of a hermaphrodite flower. Description of the ridges of the fruit refer to the primary ridges, unless otherwise specified.

Ripe fruit is essential for the certain identification of some genera, though with a little experience the characters of the ripe fruit can often be deduced from a careful examination of unripe fruit or even the ovary. Some genera which have the ripe fruit strongly compressed or winged (e.g. *Peucedanum*) do not show these characters when young.

- | | | |
|--|---|-----|
| 1. All leaves simple, entire or denticulate
Leaves deeply and repeatedly divided, or sometimes
crenate or dentate | 14. <i>Bupleurum</i> | 2. |
| 2. Leaf-lobes spine-tipped, glaucous
Leaf-lobes without spines, green | | 3. |
| 3. Flowers sessile or subsessile in a capitulum
Flowers in an umbel, male flowers clustered round
a female or hermaphrodite flower with their pedicels
more or less connate to the ovary | 1. <i>Eryngium</i> | 4. |
| 4. Fruit linear, protracted into a beak
Fruit without beak | 2. <i>Echinophora</i> | |
| 5. Fruit + beak 7-10 mm. long
Fruit + beak 15-30 mm. long | | 5. |
| 6. Lateral ridges of fruit with a distinct, but sometimes
narrow, more or less membranous wing, or thickened
and rounded at the outer edge
Fruit unwinged; ridges without thickened or wing-
like edge | 3. <i>Anthriscus</i>
4. <i>Scandix</i> | 6. |
| 7. Margin of fruit conspicuously thickened
Margin of fruit with thin lateral wing | | 7. |
| 8. Bracts 0
Bracts numerous | 24. <i>Tordylium</i> | 9. |
| 9. Flowers yellow
Flowers white, pink, greenish- or yellowish-white | | 8. |
| 10. Fruit at least 3 times as long as wide
Fruit less than 3 times as long as wide | 22. <i>Ferula</i>
23. <i>Ferulago</i> | 10. |
| 11. Bracts and bracteoles 0 or few
Bracts and bracteoles numerous | | 15. |
| 12. Leaf-lobes ovate to suborbicular in outline
Leaf-lobes filiform | 12. <i>Kundmannia</i> | 11. |
| 13. Perennial or biennial; rays stout, usually c. 20, very
unequal; fruit scarcely compressed
Annual; rays slender, usually c. 40, subequal; fruit
strongly compressed | | 12. |
| 14. Leaf-lobes filiform to linear-obovate; rays stout
Leaf-lobes lanceolate to ovate; rays slender | 7. <i>Smyrnium</i> | 14. |
| 15. Fruit glabrous, not prickly, though sometimes rugose,
muricate or densely papillose
Fruit pubescent, hispid or with prickles | 11. <i>Foeniculum</i>
18. <i>Ridolfia</i> | 13. |
| 16. Fruit rugose
Fruit smooth except for the longitudinal ridges | 9. <i>Crithmum</i>
17. <i>Petroselinum</i> | 16. |
| 17. Fruit not or scarcely longer than wide
Fruit distinctly longer than wide | | 25. |
| | 6. <i>Bifora</i>
21. <i>Capnophyllum</i> | 17. |
| | | 18. |

18. Fruit globose; mericarps not separating at maturity
Fruit usually ovoid; mericarps readily separating at maturity

19. Lowest leaves 1-pinnate or simple
Lowest leaves 2-pinnate or 2-ternate

20. Stems creeping and rooting at nodes
Stems more or less erect, not rooting at nodes

21. Bracts 0, or 1 simple bract
Bracts 3-fid or pinnatisect

22. Bracteoles strongly dimorphic, some spatulate and often inflated, some subulate
Bracteoles all lanceolate, not dimorphic

23. Rays 5-7
Rays (6-) 10-60

24. Bracts (0-) 5-6, narrowly triangular to ovate-lanceolate
Deflexed bracts 3-fid or pinnatisect

25. Outer mericarp of each fruit with straight prickles, inner mericarp tuberculate or with short conical projections
Both mericarps similar

26. Fruit setulose or with patent hairs
Fruit with prickles

27. Rays 7-50; bracts absent or 1
Rays 1-5; bracts 2-4, longer than rays

28. At least some bracts 3-fid or pinnatisect
Bracts simple or 0

Subfam. Saniculoideae. Leaves always exstipulate. Endocarp soft; vittae usually present in the ripe fruit. Style surrounded by the annular or pelviform stylopodium. Fruit usually scaly.

1. *Eryngium* L.

Glabrous herbs. Leaves entire to 3-pinnatisect, at least the upper softly to pungently spiny. Inflorescence usually branched; flowers sessile in hemispherical to cylindrical capitula, at the base of which are 3 or more, softly to pungently, spinescent bracts; entire 3- or 4-cuspidate bracteoles present at least near the edges of the capitula. Sepals rigid; petals less than 4 mm. long, erect, emarginate, shorter than sepals. Fruit ovoid to subglobose, nearly always sparsely or densely covered with scales; mericarps plano-convex, slightly ridged; vittae usually slender; carpophore absent.

1. *E. maritimum* L.

Plate XXX

Xewk ir-ramel
Sea Holly

Perennial, perhaps sometimes monocarpic; stems 15-60 cm. high, erect, branched above. Lamina of basal leaves 4-10 x 5-15 cm., suborbicular, truncate or cordate at base, 3- (to 5-) lobed, coriaceous, with coarse, patent, spinescent teeth; petiole equalling lamina, unwinged, entire. Inflorescence spreading, bluish,

3. *Coriandrum*

16. *Apium*

8. *Pimpinella*

19. *Ammi*

20. *Ammoides*

10. *Genanthus*

13. *Contum*

19. *Ammi*

25. *Torilis*

8. *Pimpinella*

15. *Cuminum*

26. *Daucus*

27. *Pseudorhiza*

19.

20.

22.

21.

23.

24.

26.

27.

28.

with numerous, pedunculate, subglobose capitula 1.5-3 cm. in diameter. Bracts 2.5-4 cm. long, 4-7, ovate or ovate-lanceolate, with 1-3 pairs of broad, spinescent teeth; bracteoles 3-cuspidate. Sepals 4-5 mm. long, ovate-lanceolate, aristate. Fruit densely scaly. $2n = 16$. Fl. 6-10.

Sandy sea shores. *Malta*: local (G. Lanfranco), as at Ghadira, the peninsula of Marfa, Gnejna, Bahar id-Caghaq (S. & C.G.; Wolseley); St. Paul's Bay (Ghbi); Golden Bay (Haslam). *Gozo*: frequent (Borg); Ramla (S. & C.G.; Wolseley). *Comino*: frequent (Borg); Sta. Marija (S. & C.G.).

Atlantic coasts of Europe from Portugal to Shetland; S. Scandinavia, North Sea and Baltic coasts to the Gulf of Bothnia; Mediterranean and Black Seas.

Subfam. Apioideae. Leaves always exstipulate. Endocarp soft; vittae usually present in the ripe fruit. Style terminal on the stylopodium. Fruit never scaly.

2. *Echinophora* L.

Leaves 2- to 3-pinnate. Sepals pungent, persistent, often unequal in the outer flowers. Petals white or yellow, oblanceolate, emarginate, the outer often larger; apex inflexed. Fruit ovoid-oblong; styles long, persistent, woody; ridges low, indistinct; vittae solitary.

1. *E. spinosa* L.

Echinophora

More or less pubescent perennial up to 50 cm. high. Leaves 2-pinnate, rigid; lobes thick, keeled beneath, sulcate above, spine-tipped. Rays 4-8, pubescent. Bracts and bracteoles 5-10, oblong-lanceolate to linear, spinose. Each partial umbel with a central hermaphrodite flower and a number of male flowers whose more or less connate pedicels form an involucre round the fruit. Petals white, or very rarely pink, pubescent on the back, the outer larger than the inner. Fl. 6-9.

Sandy sea shores. *Malta*: rare (G. Lanfranco), at Ramla tat-Torri (S. & C.G.; Borg; Wolseley). *Gozo*: Ramla (S. & C.G.; Godfrey; Borg).

Mediterranean region.

3. *Anthriscus* Pers.

Leaves 2- to 3-pinnate. Sepals minute or absent. Petals white, emarginate; apex inflexed. Fruit narrowly oblong, rarely ovoid, with a usually well-developed beak; commissure constricted. Ridges confined to the beak; vittae solitary.

1. *A. cerefolium* (L.) Hoffm.

Garden Chervil

Wiry annual up to 70 cm. high. Leaves 3-pinnate with pinnatifid lobes. Rays 2-6, more or less pubescent. Bracteoles linear. Fruit 7-10 mm. long, almost glaucous, with a prominent slender beak up to 4 mm. long. Styles much longer than the stylopodium, nearly erect. Fl. 4-5.

Malta: cultivated as a condiment (Borg); naturalised outside the Addolorata Cemetery (Wolseley).

4. *Scandix* L.

Leaves (1-) 2- to 3-pinnate, with narrow lobes. Umbels with few rays, sometimes reduced to one ray only. Sepals absent. Petals white, oblong, often very unequal in the outer flowers; apex incurved or inflexed. Fruit subcylindrical, slightly compressed laterally, beak up to four times as long as the seed-bearing part. Ridges prominent, slender; vittae very slender.

1. *S. pecten-veneris* L.

Plate XXVIII

Maxxita
Shepherd's-needle

Up to 50 cm. high. Leaves 2- to 3-pinnate, with linear lobes. Rays 1-3. Bracts absent or rarely few, bracteoles sometimes with membranous margins, simple or irregularly divided, with jagged teeth, often with patent hairs. Outer petals often somewhat enlarged and radiate. Fruit 15-80 mm. long, usually large and robust; beak usually longer than seed-bearing part of fruit, more or less strongly flattened dorsally. $2n = 16$. Fl. 3-4.

Cultivated and waste places. *Malta*: common (S. & C.G.; Borg; Wolseley). *Gozo*: frequent (S. & C.G.; Borg; Wolseley). *Comino*: (Borg).

Europe from S. Sweden to C. Russia and the Mediterranean region; eastwards to W. Himalayas; introduced in S. Africa, N. America, Chile, New Zealand etc.

5. *Coriandrum* L.

Lowest leaves lobed, others 1- to 3-pinnate. Sepals conspicuous, unequal. Petals white, the outer larger and deeply 2-lobed; apex inflexed. Fruit ovoid or globose, hard; mericarps not separating at maturity. Ridges low; vittae solitary, inconspicuous in fruit.

1. *C. sativum* L.

Plate XXVIII

Kosbor
Coriander

Glabrous annual 15-50 cm. high, foetid when fresh. Segments of lower leaves ovate-cuneate, irregularly toothed; lobes of upper leaves linear. Rays 3-5 (-10). Bracts 0 or 1; bracteoles usually 3, linear. Fruit 2-6 x 2-5.5 mm. $2n = 22$. Fl. 4-5.

Malta: cultivated for its aromatic fruits; occasionally naturalised (Borg).

Native of N. Africa and W. Asia; cultivated widely in S. Europe and often naturalised.

6. *Bifora* Hoffm.

Leaves 1- to 2-pinnate; lobes linear or filiform. Sepals small or absent. Petals white, obcordate; apex inflexed. Fruit didymous; mericarps almost spherical, attached by the small commissure but separating when ripe. Ridges scarcely visible.

Lobes of upper leaves linear, flat; rays 1-3 (5); petals of all flowers nearly equal; style c. 0.2 mm. long

1. *testiculata*

Lobes of upper leaves filiform; rays 3-8; outer petals of marginal flowers much larger than others; style 1-1.5 mm. long

2. *radians*

1. *B. testiculata* (L.) Roth

Plate XXVIII

Kosbor salvagg
Mediterranean Bifora

Glabrous annual 20-40 cm. high. Stem usually freely branched. Leaves 1- to 2-pinnate, oblong in outline; lobes of upper leaves linear, flat, entire or lobed. Rays up to 10 mm. long, 1-3 (-5). Bracts 0 or 1; bracteoles 2-3, subulate. Petals of all flowers nearly equal. Fruit 2.5-3.5 x 4.5-7 mm., rugose, shortly beaked; style not more than 0.2 mm. long, scarcely as long as stylopodium. Fl. 3-5.

Fields. *Malta*: occasional (G. Lanfranco); at Gnejna, Wied Gerżuma, St. Paul's Bay, Zebbieh (S. & C.G.; Borg); Wied Balluta, Sliema (GD.; Borg); San Martin, Wardija, Pwales (Borg).

Mediterranean region.

2. *B. radians* Bieb.

Southern Bifora

Differs from *B. testiculata* as follows; lobes of upper leaves filiform; rays up to 25 mm. long, 3-8; outer petals of marginal flowers much larger than others; fruit rugulose; unbeaked; style 1-1.5 mm. long, at least twice as long as stylopodium. Fl. 3-5.

Malta: *Gulia*, without locality; not found since (Borg).

S. & C. Europe; Caucasus; Asia Minor.

7. *Smyrniium* L.

Lower leaves usually 2- to 3-ternate, upper usually simple. Sepals absent. Petals yellow, lanceolate to obcordate; apex inflexed. Fruit ovoid or subglobose, didymous. Ridges slender, the marginal usually inconspicuous; vittae numerous, scattered.

1. *S. olusatrum* L.

Plate XXIX

Karfus il-hmir
Alexanders

Glabrous biennial 50-150 cm. high. Stem stout, solid, becoming hollow when old; upper branches often opposite. Leaves dark green and shiny; basal c. 30 cm. long, triangular in outline, ternate; segments 1- to 2-pinnate; lobes 10-60 mm. long, rhombic-ovate, crenate-dentate and sometimes lobed; cauline leaves smaller and less divided, with short, inflated petioles. Rays (3-) 7-15 (-18). Bracts and bracteoles few, small, sometimes 0. Fruit 7-8 mm. long, black. $2n = 22$. Fl. 2-4.

Shaded places in valleys and fields under carob trees. *Malta* and *Gozo*: common everywhere (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Comino*: rare (Borg).

Mediterranean region extending northwards to N.W. France; S.W. Asia; extensively naturalized in Britain and Ireland.

8. *Pimpinella* L.

Basal leaves usually entire or trisect, sometimes 1- to 3-pinnate; middle cauline usually 2-pinnate, with narrow lobes. Sepals usually minute. Petals white or yellow, rarely pink or purplish, not or slightly emarginate; apex inflexed. Fruit ovoid-oblong to subglobose, laterally compressed, constricted at the commissure. Ridges filiform, sometimes concealed by hairs, setae or tubercles; vittae (2-) 3 (-4).

Rays 7-15; fruit with short, appressed hairs

1. *anisum*

Rays usually more than 15; fruit with long, patent hairs

2. *peregrina*

1. *P. anisum* L.

Anisi, Hlewwa
Anise

Finely pubescent, strongly aromatic annual 15-50 cm. high. Stem terete, striate, branched above. Lowest leaves reniform, incise-dentate or shallowly lobed; next leaves pinnate with 3-5, ovate or obovate, dentate segments; upper cauline leaves 2- to 3-pinnate, with linear-lanceolate lobes and narrow, sheathing petioles. Rays 7-15, sparsely puberulent. Bracts absent or 1; bracteoles usually few, filiform. Petals white. Fruit 3-5 mm. long, ovoid to oblong, shortly appressed-setose. Fl. 4-5.

Malta: cultivated for centuries for its aromatic fruit, sometimes sub-spontaneous (Borg).

Widely cultivated and often naturalized; native distribution unknown, but certainly of Asiatic origin.

2. *P. peregrina* L.

Plate XXIX

Sensia

Southern Burnet-saxifrage

Finely pubescent biennial 50-100 cm. high. Lowest leaves simple, cordate, serrate; next leaves pinnate, the segments 5-9, suborbicular, more or less cordate at base, crenate; the upper cauline 2-pinnate, with linear, often recurved lobes. Rays 3-50, filiform, setulose. Bracts and bracteoles absent. Fruit c. 2 mm. in diameter, ovoid, with patent hairs. Fl. 5-6.

Field-margins and rocky ground, particularly on the coralline plateaus. *Malta* and *Gozo*: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley).

9. *Crithmum* L.

Leaves 1- to 2-pinnate with subterete fleshy segments. Sepals minute. Petals yellowish-green, obcordate; apex inflexed. Fruit ovoid-oblong, not compressed; pericarp spongy. Ridges thick and prominent; vittae several.

1. *C. maritimum* L.

Plate XXIX

Bushy El-bahar

Rock Samphire

Glabrous perennial 15-30 cm. high, woody below. Leaves deltate in outline; lobes 1-5 cm. long, linear-oblongate, subacute. Rays 8-36, rather stout. Bracts and bracteoles triangular-lanceolate to linear-lanceolate, ultimately deflexed. Fruit 5-6 mm. long, yellowish or purplish. Fl. 6-9.

Rocky coasts; occasionally on walls inland. *Malta* and *Gozo*: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Comino*: (Borg; Wolseley).

Atlantic coast of Europe, northwards to Scotland; Mediterranean and Black Sea coasts.

10. *Oenanthe* L.

Leaves pinnate or pinnatisect. Sepals acute, persistent. Petals white or pale pink, notched, the outer radiating; apex long, inflexed. Fruit ovoid, cylindrical, obconical or globose; commissure wide. Lateral ridges grooved or thickened, sometimes obscure; vittae solitary.

1. *O. globulosa* L.

Plate XXIX

Round-headed Water-dropwort

Much branched perennial, rarely more than 50 cm. high. Roots with ovoid tubers, distant from stem. Stem hollow, grooved. Basal leaves 2-pinnate; lobes grooved. Basal leaves 1- to 2-pinnate; lobes linear. Cauline leaves pinnate or simple, linear-lanceolate; lobes linear to linear-lanceolate, umbels terminal. Peduncle longer than rays. Rays 5-7, slightly thickened in fruit. Fruit 3.5-4 mm. in diameter, elliptical. Styles at least as long as fruit. Fl. 3-5.

Winter-wet places. *Malta*: frequent (G. Lanfranco); as at Gnejna, Fiddien, Mtabieb, Wied Qirda (S. & C.G.; Borg; Wolseley); St. Paul's Bay (S. & C.G.; Ghajn Rihana, Ghajn Mula (Borg); Wied Qlegha (Lanfranco); Buskett (Lanfranco; Wolseley); Wied ta' l-Isqof & Wied Qannotta (Wolseley). *Gozo*: Ramla Valley (Borg; Wolseley).

W. Mediterranean region; Portugal; N. Africa.

11. *Foeniculum* Miller

Leaves 3- to 4-pinnate with long filiform lobes. Sepals absent. Petals yellow, oblong, scarcely narrowed to the involute apex. Fruit ovoid-oblong, scarcely compressed. Ridges stout, prominent, the lateral somewhat wider than the others; vittae solitary.

1. *F. vulgare* Miller

Plate XXX

Dr. Lles

Samol

Glabrous, glaucous perennial or biennial up to 250 cm. high. Stem striate, shiny, developing a small hollow when old. Leaves more or less triangular in outline, lobes usually 5-50 mm. long, filiform, acuminate, cartilaginous at apex, usually widely spaced and not all lying in one plane; petioles of upper leaves usually 3-6 mm. long. Rays 4-30. Bracts and bracteoles usually 8. Fruit 4-10 mm. long, ovoid-oblong; lateral ridges scarcely more prominent than dorsal. Fl. 5-10.

Two subspecies are recorded. Subsp. *vulgare* is often biennial; leaf-lobes usually more than 10 mm. long, flaccid; terminal umbel not overtopped by lateral ones; rays usually 12-25; fruit sweet tasting. Sometimes cultivated as a vegetable and or flavouring. Subsp. *piperitum* (Ucria) Coutinho is perennial; leaf-lobes seldom more than 10 mm. long, rigid and rather fleshy; terminal umbel often overtopped by lateral ones; rays usually 4-10; fruit sharp tasting.

Arid rocky ground and abandoned fields. *Malta*, *Gozo* and *Comino*: common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Usually maritime. Most of Europe except the north, but probably native only in the south and south-west; W. Asia; N. Africa.

12. *Kundmania* Scop.

Leaves 1- to 2-pinnate, with ovate segments. Sepals small, somewhat scarious. Petals yellow, broadly ovate; apex involute. Fruit nearly cylindrical. Ridges slender but prominent; vittae numerous, irregularly arranged.

1. *K. sicula* (L.) DC.

Plate XXXVIII

Kundmania

Glabrous perennial 20-70 cm. high. Lower leaves usually 2-pinnate with a pair of supplementary segments at the base of each pair of primary branches; lobes ovate, crenate-serrate, the lowest sometimes lobed; upper cauline leaves bipinnate, the segments incise-serrate or lacerate. Umbels with 5-30 subequal rays. Bracts and bracteoles numerous, linear. Fruit 6-10 mm. in diameter. Fl. 4-5.

Arid, rocky, wasteland. *Malta* and *Gozo*: frequent, especially in the western districts (S. & C.G.; Borg; Lanfranco).

Mediterranean region; extending to Portugal.

13. *Ceanium* L.

Leaves 2- to 4-pinnate; lobes serrate or pinnatifid. Sepals absent. Petals white, obcordate; apex inflexed. Fruit subglobose, laterally compressed. Ridges prominent, often undulate-crispate; vittae absent.

1. *C. maculatum* L.

Plate XXXII

Hemlock

Nearly glabrous annual or biennial 50-250 cm. high. Stem pruinose, usually with reddish-brown spots below, hollow. Leaves up to 50 x 40 cm., triangular in outline, 2- to 4-pinnate, soft, entirely glabrous; lobes 10-20 mm. long, oblong-lanceolate to deltate, pinnatifid, coarsely serrate or crenate-serrate. Rays (6-)10-20, often puberulent. Bracts (0-)5-6, narrowly triangular to ovate-lanceolate, deflexed; margin scarious; bracteoles 3-6, on the outside of the partial umbel, widened at base and often connate. Fruit 2.5-3.5 mm. long.

Malta: Addolorata Cemetery (I.M. Evans; M. Gauci; Wolseley); Mount Carmel Hospital; Wied Incita (G. Lanfranco).

Almost throughout Europe, except the extreme north.

14. *Bupleurum* L.

Leaves simple. Sepals usually absent. Petals yellow, not emarginate; apex inflexed. Fruit usually ovoid or oblong. Ridges usually conspicuous; vittae 1-5.

- Leaves perfoliate; bracts absent; bracteoles suborbicular 1. *lanceifolium*
 Leaves not perfoliate; bracts present though sometimes deciduous; bracteoles linear 2. *semicompositum*

1. *B. lanceifolium* Hornem. Widnet il-fenek
B. rotundifolium var. *subovatum* (Link) Borg Spear-leaved Hare's-ear

Erect, glaucous, often purple-tinged annual 15-75 cm. high. Leaves ovate or oblong-lanceolate, often mucronate. Rays 2-3, (-5), often somewhat thickened at base and apex. Bracteoles 5-6, suborbicular, mucronate, shortly connate at base, yellowish-green and patent in flower, becoming whitish and connivent in fruit; veins conspicuous. Fruit 3-5 mm. long, ovoid-globose, blackish-brown, conspicuously tuberculate. Fl. 3-5.

Cultivated places; occasionally on rocky wastes. *Malta* and *Gozo*: locally frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Comino*: (S. & C.G.; Borg).

Mediterranean region north to C. Europe; W. Asia.

2. *B. semicompositum* L. Plate XXVIII Grey Hare's-ear
B. glaucum Robill.

Much-branched, spreading, glaucous annual up to 30 cm. high. Lower leaves spatulate to linear, petiolate, obtuse to acute; upper linear, sessile, semi-amplexicaul, acuminate; veins 3-5. Rays 3-6, filiform. Bracts 1/3 to 1/2 as long as the longest rays, linear, 3-veined; bracteoles exceeding the flowers, linear-lanceolate or rarely narrowly elliptical, aristate; veins 3, very prominent. Fruit 1.5-2 mm. in diameter, subglobose or ovoid-oblong, covered with small whitish papillae; ridges slender, inconspicuous. Fl. 3-4.

Malta: rare between Qormi and Marsa (S. & C.G.; Borg).

Mediterranean region; W. Asia.

15. *Cuminum* L.

Leaves 2-ternate. Sepals subulate, conspicuous. Petals white or pink, emarginate; apex long, inflexed. Fruit ovoid-oblong, dorsally compressed. Ridges filiform; the secondary more conspicuous; vittae solitary.

1. *C. cyminum* L. Plate XXXI Kemmun Cumin

Slender annual, 10-50 cm. high. Leaves with filiform lobes 2-5 cm. long. Rays 15, rather stout. Bracts 2-4, filiform or 3-fid, usually longer than the rays; bracteoles usually 3, very unequal. Flowers 3-5 in each partial umbel; pedicels stout. Fruit 4-5 mm. long, ovoid-oblong, setulose or glabrous. Fl. 5-6.

Malta, *Gozo* and *Comino*: cultivated for centuries and occasionally spontaneous (Borg).

Native of N. Africa and S.W. Asia; cultivated in the Mediterranean region for its fruits and more or less naturalized locally.

16. *Apium* L.

Leaves pinnate or the upper ternate. Sepals minute or absent. Petals whitish, not emarginate; apex sometimes inflexed. Fruit ovoid or elliptic-oblong, laterally compressed. Ridges usually stout; vittae solitary.

- Bracteoles absent 1. *graveolens*
 Bracteoles 5-7... 2. *nodiflorum*

1. *A. graveolens* L. Plate XXXI Karfus Wild Celery

Stout biennial up to 100 cm. high, with a strong, characteristic smell. Stem sulcate, solid. Leaves 1- to 2-pinnate; segments 5-50 mm. long, deltate, rhombic or lanceolate, lobed and serrate or almost crenate. Umbels mostly shortly pedunculate or sessile, often leaf-opposed. Rays 4-12. Bracts and bracteoles absent. Fruit 1.5-2 mm. long, broadly ovoid. Fl. 4-9.

Along water-courses. Variants are cultivated for the edible petioles (celery). *Malta*: rare (G. Lanfranco), as at Mthleb, Fiddien, Ta' Baldu, Gnejna (S. & C.G.; Borg), Wied Hazrun (Borg; Wolseley). *Gozo*: Xlendi Valley (S. & C.G.; Borg; Royce).

Coastal regions of much of the Old World and S. America; introduced elsewhere.

2. *A. nodiflorum* (L.) Lag. Karfus tal-ima
 Fools Water-cress
 Procumbent Marshwort

Procumbent or ascending perennial up to 100 cm. high. Stems hollow, rooting at the lower nodes. Leaves 1-pinnate; segments 10-60 mm. long, 7-13, lanceolate to ovate, serrate and often somewhat lobed. Peduncle usually shorter than rays, often almost absent; umbels leaf-opposed. Rays 3-12. Bracts usually absent, rarely 1 or 2; bracteoles 5-7, ovate or lanceolate, with a white membranous margin. Fruit 1.5-2 mm. in diameter, longer than broad, ovoid. $2n = 22$. Fl. 4-9.

Along water-courses. *Malta*: frequent as at Gnejna, Mthleb, Bahrija, Fiddien, Chadwick Lakes (Borg; Wolseley); Ghajn Taffieha, Wied Gerzuma, Mellicha, Gircanti (Borg). *Gozo*: Mgarr, Zenqa, Marsalforn (Borg); Xlendi (Borg; Wolseley).

Much of Europe; S.W. Asia; N. Africa; introduced in N. America and Chile.

17. *Petroselinum* Hill

Leaves 1- to 3-pinnate. Sepals minute. Petals white or yellowish, emarginate; apex inflexed. Fruit ovoid. Ridges filiform, conspicuous; vittae solitary.

1. *P. crispum* (Miller) W.W. Hill Plate XXXI Tursin Wild Parsley
P. hortense auct.

Erect, glabrous biennial up to 75 cm. high. Stem terete, solid; branches ascending. Leaves triangular in outline, 3-pinnate; lobes 10-20 mm. long, cuneate, lobed, often crispate in cultivars. Umbels flat-topped. Rays 8-20. Bracts 1-3, entire or 3-fid; bracteoles 5-8, linear-oblong to ovate-cuspidate. Petals yellowish. Fruit 2.5-3 mm. in diameter, broadly ovoid. Fl. 4-10.

Cultivated as a herb; naturalised or native along streams and in humid places. Malta: Gnejna, Girgenti, (S. & C.G.; Borg). Gozo: Xlendi valley (Wolseley).

Cultivated and naturalised in much of Europe; origin uncertain but perhaps S.E. Europe or W. Asia.

18. *Ridolfia* Moris

Leaves 4-pinnate, with filiform lobes. Sepals absent. Petals yellow, ovate; apex inflexed, truncate. Fruit ovoid-cylindrical, compressed laterally. Ridges slender, scarcely prominent; vittae solitary, slender.

1. *R. segetum* Moris

Plate XXXI

Busbies il-Qamh
Ridolfia

Glabrous annual with stems 40-100 cm. high. Leaves with long, divaricate lobes, the upper often reduced to the inflated petiole. Umbels with 10-60, slender, nearly equal rays. Bracts and bracteoles absent. Fruit 1.2-2.5 mm. in diameter. Fl. 4-6.

In fields among crops. Malta: locally abundant (Borg; G. Lanfranco); as at St. Paul's Bay, Mellieha, Bingemma (S. & C.G.); Gnejna, Rabat (Wolseley). Gozo: Nadar (S. & C.G.); Xaghra (Wolseley). Comino: (Borg).

Mediterranean region; W. Africa.

19. *Ammi* L.

Leaves 1 to 3-pinnate or ternate. Sepals very small or absent. Petals white or yellowish, obovate; the outer larger; apex inflexed. Fruit ovoid or ovoid-oblong, slightly laterally compressed, constricted at the commissure. Primary ridges filiform, prominent; vittae solitary.

Rays patent or erecto-patent in flower, becoming erect, thickened and indurate in fruit.

Rays patent and slender in flower and fruit.

1. *visnaga*

2. *majus*

1. *A. visnaga* (L.) Lam.

Busnaga
Sand Bullwort

Robust annual or biennial up to 100 cm. high. Lower leaves pinnate, others 2- to 3-pinnate, all with narrowly linear or filiform lobes. Rays up to c. 150, slender and patent in flower, becoming erect, thickened and indurate in fruit. Bracts 1- to 2-pinnatisect, equalling or exceeding the rays; bracteoles subulate. Pedicels erect, stout and rigid in fruit. Fruit 2-2.5 mm. in diameter. Fl. 5-10.

Cultivated and waste ground. Malta: common (GD.; Gullia); not seen by later botanists (Borg).

Mediterranean region and Portugal; W. Asia.

2. *A. majus* L.

Plate XXXI

Dakra
Bullwort

Annual 30-100 cm. high, very variable in habit and leaf-dissection. Leaves 2- to 3-pinnate; lower usually with elliptical or obovate, obtuse, serrate lobes; middle with lanceolate, acuminate, serrate to dentate lobes; upper with linear, dentate lobes. Rays 15-60, slender and erecto-patent in flower and fruit. Bracts 3-fid or pinnatisect, with filiform lobes; sometimes entire; bracteoles lanceolate, acuminate to linear-lanceolate. Pedicels slender. Fruit c. 1.75 mm. in diameter. Fl. 4-6.

Cultivated and waste places. Malta and Gozo: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region; W. Asia; occasional weed elsewhere.

20. *Ammoides* Adanson

Leaves 2-pinnate, with linear segments. Sepals absent. Petals whitish, with a suborbicular lobe projecting on either side of the inflexed, oblong apex. Fruit broadly ovoid, laterally compressed, not constricted at the commissure. Ridges filiform, prominent; vittae solitary.

1. *A. pusilla* (Brot.) Breistr.

Plate XXXI

Small Bullwort

Petroselinum ammoides (L.) Reichenb. fil.

Slender, glabrous annual 10-50 cm. high. Leaves glaucous, the lower 2-pinnate, oblong in outline, with 7-11 pairs of very short lobes, the middle with 3-5 pairs of segments, the upper usually with 2-3 long filiform segments. Rays 5-11, slender, unequal. Bracts absent or few and caducous; bracteoles 4-6, some linear-lanceolate, others spatulate and inflated distally, with an acuminate apex. Pedicels unequal. Fruit c. 1 mm. in diameter. Fl. 3-6.

Cultivated and arid waste places. Malta: common (Borg; G. Lanfranco; Kramer & Westra; Wolseley). Gozo and Comino: less frequent (Borg).

Mediterranean region, extending to Portugal.

21. *Capnophyllum* Gaertner

Leaves 3-pinnate resembling those of *Fumaria*. Sepals absent or small. Petals white; apex involute. Fruit ovoid, somewhat compressed dorsally. Ridges very prominent, the lateral thicker than the dorsal and sometimes narrowly winged, all transversely rugose-scrubrid; vittae solitary, in the ridges and sometimes between them.

1. *C. peregrinum* (L.) Lowe

Plate XXXII

Capnophyllum

Kruberia peregrina (L.) Lowe

Glabrous annual 10-50 cm. high. Stem solid, sulcate. Leaf-segments broadly triangular with entire or lobed, lanceolate to linear lobes. Rays 2-5. Bracts absent or few; bracteoles 4-6, shortly triangular. Fruit 4-6 mm. long. Fl. 4-5.

Malta: rare. Ghajn Mula, Ghajn Rihana (Borg).

W. Mediterranean region: Atlantic Islands.

22. *Ferula* L.

Perennial. Leaves 3- to 4-pinnate or ternate with usually linear lobes. Bracts absent; bracteoles absent or few. Sepals absent or minute. Petals yellow. Fruit elliptical, strongly compressed dorsally, with thin lateral wings closely appressed to one another and filiform or slightly carinate dorsal ridges. Vittae usually numerous.

1. *F. communis* L.

Plate XXX

Ferla

Common Ferula

Stem up to 200 cm. high or more, very robust. Leaves with conspicuous sheathing bases; lamina finely divided, with linear lobes up to 50 x 0.5-3 mm.

margins not distinctly revolute, upper leaves of the inflorescence progressively reduced to conspicuous sheathing bases only. Terminal umbel more or less sessile, surrounded by smaller lateral umbels on long peduncles, which may themselves have secondary lateral umbels. Bracts 0; bracteoles few, linear-lanceolate, deciduous. Terminal umbels with 20-40 rays. Fruit c. 15 mm. in diameter. Fl. 3-5.

Two subspecies are recorded. Subsp. *communis* has the leaf-lobes not more than 1 mm. wide and green on both surfaces. Subsp. *glauca* (L.) Rouy & Camus has the leaf-lobes up to 3 mm. wide, bright green above and distinctly glaucous beneath.

Arid rocky places, abandoned fields and roadsides. *Malta* and *Gozo*: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Comino*: common (S. & C.G.; Borg; Wolseley).

Mediterranean region; Ethiopia; Atlantic Islands.

23. *Ferulago* Koch

Leaves 2- to 3(-4)-pinnate with filiform to linear-lanceolate lobes. Bracts and bracteoles well-developed and usually conspicuous. Sepals minute. Petals yellow. Fruit strongly compressed dorsally, with more or less well developed lateral wings and filiform to distinctly winged dorsal ridges; vittae numerous.

1. *F. nodosa* (L.) Boiss. Eastern *Ferulago*

Erect, glabrous perennial c. 60 cm. high. Stem very conspicuously swollen at the nodes. Leaves triangular in outline; lobes shortly linear. Bracts and bracteoles ovate-lanceolate. Fruit 8-10 mm. long, with narrow, somewhat undulate lateral wings and narrow dorsal wings. Fl. 3-6.

Arid rocky hills. *Malta*: around Ghajn il-Kbira (Delicata; Borg).

E. Mediterranean region.

24. *Tordylium* L.

Leaves simple, pinnatisect or pinnate. Sepals prominent, often unequal. Petals white or purplish, cuneate or clawed, outer larger and often 2-lobed; apex inflexed. Fruit orbicular or ovate-elliptical, strongly compressed dorsally; margin strongly thickened, usually corrugated or lobed; dorsal ridges inconspicuous; vittae usually solitary.

1. *T. apulum* L. Plate XXXII Haxixet it-trierah
Mediterranean Hartwort

Stout, softly and rather sparsely pubescent annual 20-50 cm. high. Stem densely hairy at base with sparse long hairs above, ridged, solid, branched. Leaves pinnate; lower with ovate, deeply crenate segments; uppermost with linear, entire segments. Rays 3-8. Bracts and bracteoles much shorter than the rays; several, subulate, stiffly ciliate. Outer flowers with one petal much larger than the others (4-6 mm.), more or less equally 2-lobed and appearing like 2 large petals. Fruit 5-8 mm. in diameter, with soft, vesicular hairs; wing with a thin inner part; thickened margin corrugated, minutely papillose. Fl. 2-4.

Cultivated fields and waste places. *Malta*, *Gozo* and *Comino*: very common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region.

Torilis Adanson

Annual, rarely biennial. Leaves 1-3-pinnate; the segments jaggedly toothed. Sepals small, rarely conspicuous, persistent. Petals white or pinkish; apex inflexed. Fruit linear to ovoid, narrowed at the commissure. Ridges slender, ciliate, the grooves between the ridges usually filled with spines or tubercles.

Umbels mostly lateral, leaf-opposed, peduncles up to 5 cm. long

1. *nodosa*

Umbels mostly terminal on peduncles more than 5 cm. long

1. *arvensis*

1. *T. nodosa* (L.) Gaertner Plate XXXII Knotted Hedge-parsley

Annual up to 50 cm. high, usually procumbent. Leaves 1- to 2-pinnate, with deeply pinnatifid segments. Umbels sessile to shortly pedunculate, leaf-opposed; rays very short, generally concealed by the flowers or fruit, giving the umbels a capitate appearance. Bracts absent, bracteoles exceeding the subsessile flowers. Petals pinkish-white. Fruit 2-3 mm. in diameter, outer mericarp with straight, patent spines, the inner with tubercles. $2n = 22$. Fl. 3-5.

Cultivated and waste places. *Malta* and *Gozo*: frequent (S. & C.G.; Borg; G. Lanfranco).

Mediterranean region and W. Europe.

2. *T. arvensis* (Hudson) Link subsp. *purpurea* (Ten.) Hayek
Spreading Hedge-parsley

Erect annual up to 100 cm. high, with few branches. Basal leaves (often absent at maturity) pinnate with deeply divided segments; uppermost leaves 3-foliolate, with linear-lanceolate to linear segments, the central segment very long; margin remotely serrate to subentire. More rarely upper and lower leaves similar, but upper small and less divided. Rays usually 3. Bracts 0-1; bracteoles numerous. Fruit 3-6 mm. in diameter; both mericarps spiny, or the outer spiny and the inner tuberculate; rarely the whole fruit covered with tubercles. $2n = 12$. Fl. 4-5.

Rocky places. *Malta*: rare, *Mistra* (S. & C.G.; Borg); *Onejna* (Godfery; S. & C.G.; Borg); *Wied Ghomor*, *Gharghur* (G.D.; Borg).

Mediterranean region; W. and C. Europe.

26. *Daucus* L.

Leaves 2- to 3-pinnate. Bracts several, usually pinnatisect. Sepals small or obsolete. Petals white, yellowish or purplish, the outer often radiate; apex inflexed. Fruit ellipsoid to ovoid, cylindrical or somewhat compressed dorsally; primary ridges filiform, ciliate; secondary ridges with a single row of spines.

Spines on secondary ridges of mericarp dilated, confluent at the base or winged, (1-)2-3 times as long as the width of the mericarp.

1. *guttatus*

Spines on secondary ridges of mericarp not confluent at the base, not longer than the middle of the mericarp.

2. *carota*

1. *D. guttatus* Sibth. & Sm.
D. bicolor Sibth. & Sm.

Eastern Carrot

Annual stems 20-60 cm. high, usually several, branched, erect or ascending, retrorse scabrid or sometimes hispid near the base. Lower leaves 2-pinnate, the segments divided into short, linear, acute lobes; upper leaves with linear segments. Rays 8-25. Bracts usually longer than umbels, not deflexed, pinnatifid; bracteoles linear-setaceous. Petals 0.6-2.5 mm. long, white, those of the central flower of the umbel and those of the central umbel usually dark purple. Fruit 2-4 mm. in diameter; spines of the secondary ridges 1-2 times as long as the width of the mericarp. Fl. 4-7.

Malta: collected at Todaro and Kalkara in 1843 by Caruel (Borg).

E. Mediterranean region.

2. *D. carota* L.

Plate XXXII

Sfunnarija, Zunnarija salvaggja
 Wild Carrot

Annual or biennial, variable in habit and branching; stems 10-100(-150) cm. high, glabrous to hispid. Leaves 2-to 3-pinnate, rarely less divided, the segments linear to lanceolate, glabrous to pubescent, thin or fleshy; upper cauline leaves often bract-like. Umbels concave, flat or convex, with a variable number of rays. Bracts as long as the rays or shorter, 1- to 2-pinnatisect; bracteoles of outer partial umbels 3-sect, those of the inner simple. Petals white to purplish, often with one or several flowers of the central umbel dark purple. Fruit 2-4 mm. in diameter; spines on the secondary ridges not longer than the width of the mericarps. $2n = 18$. Fl. 4-5.

Very variable. At least 3 subspecies seem to be native to Malta, while subsp. *sativus* is much cultivated. Subsp. *carota* has a white, slender taproot, erect, usually hispid stems; terminal umbel 5-15 cm. across, strongly contracted in fruit. Subsp. *sativus* (Hoffm.) Arcangeli is similar, but its tap-root is swollen, fleshy, orange or whitish. Subsp. *hispanicus* (Gouan) Thell. has a white, slender taproot, sparsely pubescent, erect stem usually more than 30 cm. high and umbels convex or only slightly contracted in fruit. Subsp. *rupestris* (Gouan) Heywood is similar but with a procumbent or ascending, densely hairy stem usually less than 10 cm. high. Subsp. *rupestris* is endemic to the Maltese Islands and Lampedusa and Lampesina.

Cultivated, waste and rocky places. Malta, Gozo, Comino and Cominotto: common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Most of Europe; Asia; N. Africa; cultivated and naturalised in many other parts of the world.

27. *Pseudorhiza* (Murb.) Murb.

Leaves 2-to 3-pinnate. Bracts several, linear. Sepals conspicuous. Petals white or purplish, scarcely radiating; apex inflexed. Fruit ellipsoid; primary ridges filiform, ciliate; secondary ridges with 2-3 rows of glochidiate spines.

1. *P. pumila* (L.) Grande
Daucus pumilus (L.) Hoffmanns. & Link

Plate XXXII

Small Carrot

Densely hairy annual up to 20 cm. high, branched from the base. Leaves 2-to 3-pinnate, the segments divided into ovate lobes. Rays 2-5, unequal. Bracts 2-5, linear, acuminate, green, sometimes 3-fid; bracteoles linear-lanceolate. Petals

white or purplish, the outer only slightly larger than the others. Fruit 7-10 x 5-6 mm., ellipsoid; lateral secondary ridges with 8 prominent, smooth spines, widened at the base, the other secondary ridges with c. 18 narrow spines 2.5-3.5 mm. long. $2n = 16$. Fl. 4-5.

Maritime sands. Malta: locally frequent (G. Lanfranco), as at Gnejna, Bahar iċ-Ċagħaq (Borg; Wolseley); Mellieħa, Maria peninsula (S. & C.G.; Borg); Ghajn Tuniħa, Marsaskala (Borg). Gozo: Ramla (S. & C.G.; Borg; J. Evans); Qbajjar (Borg). Comino: Sta. Marija Bay (Borg).

Mediterranean region.

ERICALES

LXIX. ERICACEAE

Dwarf shrubs to small trees; leaves simple, exstipulate, usually evergreen. Flowers hermaphrodite, actinomorphic (rarely slightly zygomorphic), in racemes or umbels, or solitary or in clusters in the leaf-axils. Petals usually united. Stamens twice as many as petals (rarely fewer), inserted on the receptacle or disc, but sometimes adnate to the extreme base of the corolla and falling with it; anthers usually opening by pores; pollen usually in tetrads. Ovary superior (rarely inferior); placentation axile; style single. Fruit a capsule, berry or drupe.

All European members of the family which have been investigated are mycorrhizal; the majority are calcifuge, and are especially characteristic of peaty soils and therefore notably absent from the Maltese islands.

L. *Erica* L.

Dwarf to medium-sized evergreen shrubs. Leaves whorled, often linear, or apparently linear on account of revolute margins; petiole short, appressed. Flowers 4(-5)-merous, in terminal umbels or racemes, or in axillary clusters of umbels, more or less aggregated into terminal or axillary racemes; pedicel with 2 or more bracteoles. Sepals free, seldom petaloid, much smaller than corolla; corolla sympetalous, campanulate to urceolate, with lobes shorter than or equalling tube, persistent in fruit; stamens 8(-10), inserted between the lobes of nectariferous disc. Fruit a loculicidal capsule; seeds numerous.

1. Anthers included in the corolla
 Anthers exerted from the corolla, at least in part

1. *sicula*

2.

2. Pedicel 2-3 times as long as the sepals
 Pedicel about equalling the sepals

2. *multiflora*

3. *herbacea*

1. *E. sicula* Guss.
Pentapera sicula (Guss.) Motsch

Sicilian Heath

Compact, bushy, dwarf shrub; branches erect or ascending; young twigs densely pubescent. Leaves 6-9 mm. long, in whorls of 4(-5), linear, densely pubescent when young; margins revolute, contiguous, concealing the lower surface. Flowers (4-5) merous, in terminal umbels of 4-10; pedicel with 3 bracteoles near the middle. Sepals 6 mm. long, ovate-lanceolate, pubescent, pink; corolla 7-8 mm. long, urceolate, pubescent, white or very pale pink; anthers included, without appendages. Ovary pubescent; stigma slightly capitate.

Malta: recorded by Gulia (Borg); no specimens exist in the University herbarium.

W. Sicily; Libya; Cyprus.

2. *E. multiflora* L.

Plate XXXIII

Lehjet ix-xih
Savina
Mediterranean Heath

Erect shrubs 30-80 (-250) cm. high, with rather stiff branches; young twigs minutely puberulent. Leaves 6-11 mm. long, in crowded whorls of 4-5, patent, linear, glabrous or very slightly pubescent; margins revolute, contiguous, completely concealing lower surface. Flowers in dense, terminal, elongate or capitate racemes; pedicel 4-12 mm. long, glabrous, with 3 small bracteoles at or below the middle. Sepals 2 mm. long, ovate-lanceolate, glabrous or finely ciliate; corolla 4-5.5 mm. long, cylindrical to narrowly campanulate, with erect to patent lobes; anthers 1.5 mm. long, exserted, without appendages; with the two lobes closely contiguous and parallel. Ovary glabrous; stigma scarcely wider than the style. Fl. 12-5.

Rocky hillsides and valleys, somewhat calcicole. *Malta*: locally common (G. Lanfranco), as at Wied Inčita, Wied Qirda, Wied Babu, Ta' Baldu (S. & C.G.; Borg; Wolseley); Wardija, Wied il-Ghasel, Buskett, Ta' Laurenti, Girgenti, Tal-Gholja, Dingli, Ahrax (Borg). *Gozo*: less frequent as at Mgarr ix-Xini, Xlendi, Ta' Cenc and Nadur (Borg).

Mediterranean region east to Jugoslavia.

3. *E. herbacea* L.

Pink Heath

E. carnea L.

Dwarf shrub with procumbent stems and ascending flowering branches not more than 25 cm. high; young twigs almost glabrous, bearing conspicuous ridges running from the base of each leaf downwards throughout the internode with nearly constant height and width. Leaves 5-8 mm. long, in whorls of 4, linear, with apparent margins minutely denticulate; margins revolute, closely contiguous, completely concealing the lower surface. Flowers in short, terminal leafy racemes; pedicel 2-4 mm. long, glabrous, with small bracteoles 5 mm. long, cylindrical with erect lobes, pink; anthers without appendages, usually completely exserted. Ovary glabrous; stigma scarcely wider than style. Fl. 1-4.

Rocky hillsides, calcicole. *Malta*: recorded at Wied Gerżuma by Għula where it was presumably introduced (Għula; Borg). Occasionally cultivated (Wolseley).

Alps and S.C. Europe, northwards to E.C. Germany and eastwards to E. Austria, extending southwards to C. Italy and N. Albania.

PRIMULES

LXX. PRIMULACEAE

Herbs, rarely dwarf shrubs. Leaves exstipulate, usually simple. Flowers 5(to 7)-merous, actinomorphic (rarely zygomorphic), sympetalous, hypogynous (rarely perigynous). Stamens epipetalous, opposite the corolla-lobes; staminodes sometimes present. Ovary uni-locular, with 1-numerous ovules and basal, free-central placenta; style simple; ovules with 2 integuments. Fruit a capsule. Seeds endospermic.

Flowers solitary in the axils of leaves; flowers red, blue or paler colours

Inflorescence racemose; flowers white

1. *Anagallis*

2. *Samolus*

1. *Anagallis* L.

Glabrous herbs. Leaves opposite or alternate. Flowers 5-partite, solitary, axillary, pedicellate or rarely subsessile. Corolla rotate or infundibuliform. Capsule globose, circumscissile. Seeds 6-45, papillose.

1. *A. arvensis* L.

Plate XXXIII

Harira hamara, kubbja
Scarlet Pimpernel

Annual or biennial, rarely short-lived perennial. Stems 6-50(-90) cm. high, quadrangular, diffuse, ascending to erect. Leaves 8-18 (-25) x 4-10(-18) mm., opposite or rarely whorled, lanceolate, ovate or cordate, sessile, both surfaces dotted with glands; margins scarious; upper leaves narrower than lower. Flowers in axils of upper leaves; pedicels 3.5-35 mm. long at flowering, recurved in fruit. Calyx 3.5-5 mm. long, divided nearly to base; lobes narrowly lanceolate, apiculate. Corolla (2-)4-7(-10) mm. long, not greatly exceeding calyx; stamens with numerous purple basal hairs. Capsule 4-6 mm. long. Seeds 12-45, brown. Fl. 2-7.

Two subspecies occur: Subsp. *arvensis* (var. *phoenicia* Gouan) with flowering pedicels exceeding subtending leaves, and a red, blue or paler-coloured corolla not concealed by the calyx in bud; and subsp. *foemina* (Miller) Schinz & Thell. (var. *caerulea* Schreber) with flowering pedicels shorter than subtending leaves and a blue corolla concealed by the calyx in bud.

Waste and cultivated places. *Malta*, *Gozo*, *Comino* and *Cominotto*: common everywhere (S. & C.G.; Borg; Wolseley).

Throughout the greater part of the world with the exception of the tropics.

2. *Samolus* L.

Perennial herbs with short fibrous or slender rhizomes. Flowers bracteolate, 5-merous. Calyx campanulate; corolla twice as long as calyx; stamens alternating with clusters of 1-2(-3) staminodes; ovary semi-inferior. Capsule globose; valves 5.

1. *S. valerandi* L.

Plate XXXIII

Harira tal-ilma
Brookweed

Glabrous with a basal rosette; stems 5-60 cm. high, leafy, erect. Leaves 10-90 x 5-25 mm., obovate to spatulate, obtuse. Corolla 2-3 mm. in diameter. Capsule = 24, 26. Fl. 3-9.

Along water-courses. *Malta* and *Gozo*: locally frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Comino*: (S. & C.G.; Borg). *Filfla*: (S. & C.G.).

Cosmopolitan, though usually near the sea.

PLUMBAGINALES

LXXI. PLUMBAGINACEAE

Perennial, rarely annual, herbs or shrubs. Leaves alternate or in a basal rosette, exstipulate. Inflorescence usually cymose, often contracted into a capitulum, rarely spike-like; flowers hermaphrodite, actinomorphic, hypogynous, 5-merous, usually in bracteate spikelets. Calyx tubular, below, toothed or lobed and at least slightly scarious and often plicate distally, persistent. Petals connate at base, or the corolla gamopetalous with a short, rarely long basal tube. Stamens free or

connate, epipetalous. Styles 5, free or connate at base, or 1, with 5 stigma-lobes. Ovary superior, 1-locular. Fruit dry, membranous, 1-seeded, surrounded by calyx, indehiscent or with circumscissile or irregular dehiscence.

Stems leafy

Leaves grouped in basal rosette or absent.

1. *Plumbago*
2. *Limonium*

1. *Plumbago* L.

Perennial herbs. Leaves alternate, simple. Inflorescence of (2-) 3-bracteate, 1-flowered spikelets grouped in spikes terminal on branches. Calyx tubular, 5-ribbed, scarious, the limb deeply 5-dentate; corolla with narrow tube and rotate limb; stamens free, style 1, with 5 stigmas. Fruit circumscissile near the base, dehiscing upwards into 5 valves.

1. *P. europaea* L.

Plate XXXIII

Plumbago

Stems 30-100 cm. high, erect, much-branched. Leaves up to 5.3 x 3.45 cm., the lower long-petiolate, ovate to oblong, cordate, the upper sessile, oblanceolate to lanceolate or linear, acute, auriculate-amplexicaul, glandular-dentate, glabrous, farinose beneath. Calyx 5-7 mm. long, densely stipitate-glandular on ribs, the teeth triangular; corolla tube 1½ times as long as calyx, the lobes obovate, violet to lilac-pink. Fruit 5-8 mm. long, oblong to oblong-ovoid. Fl. 6-11.

Dry, open habitats. *Malta*: local (G. Lanfranco), as between Qormi, Luqa and Qrendi, rare elsewhere (Borg); below Addolorata Cemetery (Wolseley); Siggiewi plain, Bidnija (Gauci).

P. auriculata Lam. (*P. capensis* Thumb.), African *Plumbago*, a native shrub of South Africa distinguished from 1 by its larger pale blue corolla (c. 25 mm. in diameter); and linear fruit (c. 12-14 mm. long) is frequently cultivated for ornament in the Maltese Islands (Wolseley).

2. *Limonium* Mill.

Perennial, rarely annual, herbs or small shrubs. Leaves usually in a basal rosette, densely leafy branches sometimes present, the leaves often absent at anthesis. Inflorescence a corymbose panicle, with terminal secund spikes, often with some non-flowering branches, usually with a reddish scale at the base of each branch. Spikes of 3-bracteate, 1- to 5-flowered spikelets; inner and outer bracts external to the spikelet, the middle one internal and often inconspicuous. Calyx infundibuliform, the limb scarious, usually coloured, 5-lobed, sometimes shortly dentate between the lobes. Corolla with a short tube, or the petals connate only at the base; stamens inserted at the base of the corolla; styles 5, glabrous, free or connate at the base; stigma filiform. Fruit a capsule, with operculate or irregular dehiscence.

1. Leaves pinnately veined
Leaves with single or parallel veins

1. *vulgare*

2. Inner bract with herbaceous keel, the midrib prolonged into a conspicuous acute point, the margin hyaline

2. *cosyrense*

Inner bract with herbaceous keel, the midrib not or shortly prolonged, the margin reddish-brown; hyaline margin absent or very narrow, not reached by the midrib-point

3.

3. Leaves 3-veined
Leaves 1-veined

5. *ramosissimum*

4. Spikes 3-5(-8) cm. long, with 1-3 spikelets per cm.; spikelets straight, cylindrical; calyx narrowly conical after pollination with straight tube
Spikes 2-4 cm. long, with 4 spikelets per cm.; spikelets arcuate, laterally compressed; calyx infundibuliform after pollination, with curved tube

3. *graeum*

4. *oleifolium*

1. *L. vulgare* Miller subsp. *serotinum* (Reichenb.) Gams Common Sea-lavender
Statice limonium L.

Plant 15-70 cm. high, glabrous. Leaves 100-150 x 15-40 mm., oblanceolate-spathulate, usually mucronate, pinnately veined, usually erect in a sparse basal rosette; petiole 2 mm. wide, ¼ as long to as long as lamina. Flowering stem cylindrical; sterile branches few, or absent; non-flowering branches absent; scales 6-18 mm. long. Spikes 1-2 cm. long, patent, with 6-8 spikelets per cm.; spikelets 2-flowered. Inner bracts 2.7-5 mm. long; outer bract 0.9-2.7 mm. long, herbaceous. Calyx 3.6-6 mm. long. Corolla 6-8 mm. long, reddish. Fl. 7-9.

Cultivated for the everlasting flowers. *Malta*: cultivated and frequently naturalised as at St. George's Bay (Haslam) and Floriana (Borg; Haslam).

S. & W. Europe extending eastwards to c. 13° E. in N. Germany; N. Africa; N. America.

2. *L. cosyrense* (Guss.) O. Kuntze
Statice minuta var. *cosyrensis* (Guss.) Fiori

Malta Sea-lavender

Plant 15-50 cm. high. Leaves 20-25 x 2.5-3 mm., flat or slightly revolute, obtuse, in rosettes on somewhat woody basal branches 1-3 cm. long. Inflorescence up to 25 cm. long; segments up to 2 cm., flexuous or rigid, diverging at an acute angle, greenish. Spikes 2-5 cm. long, lax, with 3-4 spikelets per cm.; spikelets 1-flowered. Inner bract 3.5(-4) mm. long; outer bract 1 mm. long, overlapping 1/6-1/4 of the inner. Calyx 4 mm. long, exceeding the bract by 1.5 mm.; limb campanulate 1/3-½ as long as the tube; lobes 0.8 mm.

Malta: rocky coastal slopes. Hal Far (Borg).
Pantellaria.

3. *L. graecum* (Poir.) Rech. fil. subsp. *divaricatum* (Rouy) Pignatti
Statice minuta var. *reticulata* (L.) Reichenb.

Lehjet ix-Xth

Plate XXXIII

Reticulate Sea-lavender

Plant 10-35 cm. high, glabrous, usually rough. Leaves 20-40 x 4-12 mm., linear-lanceolate to obovate-spathulate, usually on long woody basal branches and withered in summer, cauline leaves absent. Inflorescence usually with abundant non-flowering branches diverging at an angle of (45-) 60-90 (-120)°; segments 12 cm. long, more than 0.7 mm. in diameter; scales 3-4 mm. long. Spikes 3-5(-8) cm. long, with 1-3 spikelets per cm.; spikelets 1- to 5-flowered. Inner bracts 5.5-6(-8) mm. long, usually tuberculate, rounded dorsally, forming a wide, subpatent envelope around the flowers; outer bract 1.5-2.5(-3) mm. long, overlapping 1/6-1/3 of the inner. Calyx 6-7 mm. long; limb 2/3 as long as the tube. Corolla 7-8 mm. long, violet. Fl. 5-10.

Rocky coasts. *Malta*, *Gozo* and *Comino*: common (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Cominotto*: (S. & C.G.; Borg).

Subsp. *divaricatum* in W. and C. Mediterranean region from Islas Baleares to *Malta*; species extends eastwards into W. Asia.

4. *L. oleifolium* Miller subsp. *oleifolium*
Limonium nana var. *virgata* (Willd.) Borg

Lehjet ix-xih
 Violet Sea Lavender

Plant 15-50 cm. high, glabrous, smooth. Leaves 30-55 x 4-9 mm., linear-spathulate in basal rosettes. Inflorescence 10-40 cm. long; non-flowering branches abundant, branches diverging at not more than 45°; segments 15-35 mm. long, cylindrical, the lower longer than the upper. Spikes up to 4 cm. long, with 4 spikelets per cm.; spikelets 1 to 5-flowered. Inner bracts 4-5 mm. long, about equalling the calyx, outer bract 0.2-2 mm. long, overlapping 1/4 of the inner. Calyx 2.5-5 mm. long, violet. Limb half as long as the tube. Fl. 5-11.

Rocky coasts: *Malta*, *Gozo*, *Comino*: very common (Borg; G. Lanfranco; Wolseley).
Cominotto: (Borg).

Mediterranean region.

5. *L. ramosissimum* (Poirot) Maire

Branched Sea-lavender

Leaves 30-100 x 0-20 mm., obovate to oblanceolate-spathulate or subspathulate, 1- to 5-veined. Inflorescence 20-50 cm. long, scales 2-20 mm. long, often leaf-like. Spikes 1-4 cm. long, rather dense, with 4-8 spikelets per cm.; spikelets 2- to 5-flowered. Inner bract 4-5.5 mm. long; outer bract overlapping 1/4 of the inner. Calyx 4-6 mm. long; tube subcylindrical, often incurved; limb cupuliform. Corolla 5-7 mm. long, pale pink. Fl. 5-11.

Malta: Fomm Ir-Rih (Delicata).

Mediterranean region.

OLEALES

LXXII. OLEACEAE

Usually glabrous trees or shrubs. Leaves opposite, rarely alternate, exstipulate. Flower hermaphrodite, rarely unisexual, (4-) 5- to (6-) merous, actinomorphic. Calyx campanulate, often small. Corolla sympetalous or polypetalous, rarely absent. Stamens 2, often inserted on the corolla-tube. Ovary superior, 2-locular; style usually short or absent; ovules usually 2 in each loculus. Fruit a loculicidal capsule, a samara, a drupe or a berry; seeds 1-4.

Leaves pinnate; fruit with a terminal wing
 Leaves simple; fruit a drupe

1. *Fraxinus*
2. *Olea*

1. *Fraxinus* L.

Deciduous trees or shrubs. Twigs flattened at the nodes. Leaves opposite or sometimes in whorls of 3, imparipinnate, rarely reduced to one leaflet. Flowers hermaphrodite or unisexual, small, in terminal or axillary panicles. Calyx campanulate and 4-lobed, or absent; corolla usually absent, when present with 2-6 more or less distinct petals; stamens hypogynous; stigmas 2. Fruit a samara, winged distally.

1. *F. angustifolia* Vahl
F. excelsior auct.

Plate XXXIII

Fraxnu
 Narrow-leaved Ash

Tree up to 25 m. high, with grey bark, soon finely and deeply reticulate-fissured; twigs and petioles glabrous; buds dark brown. Leaves of adult tree with 5-13 leaflets, 30-90(-100) x 3-25(-30) mm., oblong to linear-lanceolate, long acuminate at the apex, cuneate and entire at the base, sessile or nearly so, the serrations

usually as many as the lateral veins; rachis glabrous. Leaflets of juvenile trees 7-15, 8-30 x 5-17 mm., obovate to ovate, obtuse to acute at apex. Calyx and corolla absent. Samara 20-45(-50) x 6-10 mm., the wing oblong-obcordate to lanceolate. 2n = 46.

Malta: Buskett valley (Borg; Wolseley; Haslam).

S. and E.C. Europe.

2. *Olea* L.

Evergreen trees or shrubs. Twigs terete or quadrangular, not flattened at the nodes. Leaves opposite, simple, lanceolate to obovate, entire, coriaceous. Flowers hermaphrodite, arranged in many-flowered axillary or terminal racemes or panicles. Calyx small, tetramerous, toothed or shallowly lobed; corolla subrotate, tetramerous, with the lobes slightly longer than broad and induplicate-valvate in bud; stamens epipetalous; anthers large; filaments short. Fruit an oleaginous drupe.

1. *O. europaea* L.

Plate XXXIII

Zebbug
 Olive

A very long-lived tree up to 15 m. high, with a broad crown and a thick trunk, sometimes a shrub; bark grey, finely fissured; twigs lepidote, grey; buds very small, lepidote-sericeous, greyish. Leaves (10-)20-80 x (3-)5-15(-20) mm., subsessile, mucronate, dark greyish-green and glabrous above, light grey and densely lepidote beneath. Inflorescence axillary. Corolla white. Drupe 10-35 x 6-20 mm., oblong to subglobose, green when unripe, becoming black, brownish-green or rarely ivory-white. 2n = 46. Fl. 3-5.

Wild plants (var. *silvestris* Brot.) differ from the cultivars mainly in the spiny lower branches and small leaves and drupes. Many cultivars (var. *europaea*) have been selected for their edible fruit, used also as a source of oil.

Cultivated and naturalised. *Malta*: formerly extensively cultivated as indicated by the place names Zebbug and Zejtun (Abela); now rare as at Wardija, Wied Has-Sapfan, below Mdina, above Chadwick Lakes (Wolseley); Buskett (Borg; Wolseley); Salini, Bajda ridge (Bowen-Jones et al.). *Gozo*: Xewkija (Wolseley).

Mediterranean region; cultivated in many other parts of the world.

GENTIANALES

LXXIII. GENTIANACEAE

Glabrous, bitter-tasting herbs. Leaves opposite (very rarely some alternate), entire, exstipulate, usually sessile and often connate at the base. Flowers hermaphrodite, 4 to 8(-to 12-) merous, actinomorphic. Calyx more or less deeply lobed. Corolla sympetalous; lobes contorted in bud. Stamens inserted on the corolla-tube. Ovary superior, 1-locular, with 2 parietal placentae; rarely almost 2-locular owing to the intrusive placentae; ovules numerous. Fruit a septicidal capsule.

Flowers yellow, 6- to 8-merous

Flowers pinkish-purple, 4- to 5-merous

1. *Blackstonia*
2. *Centaurium*

1. *Blackstonia* Hudson

Annual herbs. Calyx deeply divided into 6-12 lobes. Corolla rotate, yellow; tube short; lobes 6-12. Anthers basifixed, oblong to linear, not or scarcely twisting spirally after dehiscence. Style filiform, caducous; stigma 2-lobed.

1. *B. perfoliata* (L.) Hudson Plate XXXIII Yellow-wort.
Chloa perfoliata (L.) L. et var. *serotina* (Koch. ex Reichenb.) Ces.

Erect, glaucous annual 10-60 cm. high. Leaves 5-30 mm. long, ovate to triangular, the basal obtuse, not connate at base, the cauline acute, connate or rarely free at base. Flowers (6-)8-35 mm. long, yellow. Calyx-tube very short; lobes 6-12, linear to lanceolate. Lobes of stigma erect at anthesis, becoming patent later. $2n = 20, 40$. Fl. 3-5.

It is probable that all the plants of the Maltese Islands are referable to subsp. *serotina* (Koch ex Reichenb.) G. Beck.

Rocky plateaus and valleys. *Malta*, *Gozo* and *Comino*: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Cominotto*: (Duthie; Borg).

W. & C. Europe; Mediterranean region; naturalised in New Zealand.

2. *Centaurium Hill*

Flowers in dichasial, corymbiform or spiciform cymes. Calyx tubular, deeply divided into 5(-4), keeled, linear, acute lobes. Corolla pinkish-purple, rarely white or yellow, infundibuliform. Anthers linear or oblong-linear, twisting spirally after dehiscence. Ovary with a short, filiform, persistent style with 2 caducous stigmas. Nectaries at the base of the ovary absent.

- | | | |
|---|-----------------------|----|
| 1. Flowers in a spiciform cyme | 4. <i>spicatum</i> | 2. |
| Flowers in a corymbiform or dichasial cyme | | |
| 2. Annual or biennial with a basal leaf-rosette; flowers sessile or subsessile in a corymbiform cyme; corolla-lobes usually longer than 4.5 mm. | 1. <i>erythraea</i> | |
| Annual usually without a basal leaf-rosette; flowers usually pedicellate in usually dichasial cymes; corolla lobes 2-4 mm. | | 3. |
| 3. Stem with 3-4 internodes, branched in the lower part; branches patent | 2. <i>pulchellum</i> | |
| Stem with 5-9 internodes, branched in the upper part, branches strict | 3. <i>tenuiflorum</i> | |

1. *C. erythraea* Rafn Plate XXXIII Centawrija
Erythraea centaurium auct. Common Centuary

Annual or biennial (2-)10-60 cm. high. Stems usually solitary, sometimes several, usually branched above. Rosette leaves 1.5 x 0.8-2 cm., obovate or elliptical, usually obtuse, 3- to 7-veined; cauline leaves usually smaller, elliptical, obtuse, 3-veined, not conspicuously decreasing upwards. Upper part of stem, bracts and calyx glabrous or scaberulous. Flowers of variable size in a more or less corymbiform cyme. Calyx $\frac{1}{2}$ as long as the corolla tube. Stamens inserted at apex of corolla-tube. Fl. 4-6.

Rocky plateaus and valleys. *Malta*: St. Paul's Bay, St. Andrews, Balluta near Mdina (S. & C.G.); Wied Incita, Mtaheh (S. & C.G.; Borg); Ghajn il-Kbira, Girgeni Salini, Maghtab, Ballut tal-Wardija, San Martin, Verdala Park, Buskett (Borg, G. Lanfranco). *Gozo*: on the Plateaux between Wied Bingemma, Wied ir-Rihan and Wied Qorrot (S. & C.G.; Borg); Ta' Cene, Mgarr ix-Xini (Borg). *Comino*: frequent (S. & C.G.; Borg).

Europe from Sweden southwards; Mediterranean region; W. Asia; Atlantic Islands; naturalised in N. America.

2. *C. pulchellum* (Swartz) Druce Centawrija zghira
Erythraea pulchella (Swartz) Eries Lesser Centuary

Annuals without a basal rosette, stem 2-15 cm. high, usually dichotomously branched, with 2-4 internodes usually not elongated. Leaves 0.2-1.5 x 0.1-1 cm., ovate or ovate-lanceolate, acute, increasing in length upwards. Flowers 10-12 mm. in diameter, in a lax, dichasial cyme on short pedicels (c. 2 mm. long) or solitary (sometimes 4-merous in small, delicate, unbranched plants). Calyx nearly equaling the corolla-tube. Corolla-lobes 2-4 mm. long. $2n = 36$.

Rocky plateaus and valleys, especially near the coast. *Malta*, *Gozo* and *Comino*: common (Borg, Lanfranco).

Europe (except Iceland); Mediterranean region; W. & C. Asia; Atlantic Islands; naturalised in N. America.

3. *C. tenuiflorum* (Hoffmans. & Link) Fritsch Slender Centuary
Erythraea pulchella var. *tenuiflora* (Hoffmans. & Link) Ces.

Annual 15-25(-40) cm. high, without or with a weak basal leaf-rosette. Stem with 5-9 internodes, branched above; branches strict. Cauline leaves 1.25 x 0.8 cm., ovate or elliptical, obtuse or subacute, increasing in length upwards. Flowers 12-14 mm. in diameter, in a more or less dense dichasial cyme, on pedicels c. 2 mm. long. Calyx nearly equaling the corolla-tube. Corolla-lobes 3-4 mm. long. Fl. 4-7.

Open, grassy places. *Malta*: Buskett, Wied Incita (Borg).

Atlantic coasts and Mediterranean region; W. Asia.

4. *C. spicatum* (L.) Fritsch Spiked Centuary
Erythraea spicata (L.) Pers.

Annual or biennial with a basal leaf-rosette. Stem 10-40 cm. high, usually branched at the base or from the middle. Rosette leaves broadly ovate, caducous. Cauline leaves elliptical-oblong or lanceolate, 3- to indistinctly 5-veined. Flowers 12-14 mm. long, sessile, distant in a spiciform cyme. Calyx nearly equaling the corolla-tube. Corolla-lobes 4.5 x 1.7-2 mm. Corolla-tube 7-9 mm. long. $2n = 22$. Fl. 5-8.

Coastal places especially on the clay. *Malta*: frequent at Salini, St. Paul's Bay, Mellieha, St. Andrews, Marsa, Buskett and Ghajn il-Kbira (Borg, Lanfranco). *Gozo*: Wied il-Lunzjata, Wied ir-Ramla, near Chambray (Borg).

Atlantic coasts and Mediterranean region; W. & C. Asia.

LXXXIV. APOCYNACEAE

Small trees, shrubs or herbs, with poisonous latex. Leaves simple, exstipulate, with glands in or above the axils. Flowers solitary, or in cymes, hermaphrodite, actinomorphic, 5-merous. Corolla with oblique lobes, contorted in bud. Stamens 5; anthers introrse, closely surrounding the stigma. Carpels 2, usually free below, united into a single style above. Fruit of two fusiform follicles, usually opening by the ventral suture; rarely only one follicle developing.

Flowers in terminal corymbs
 Flower solitary, axillary

1. *Nerium*
 2. *Vitex*

1. Nerium L.

Shrubs or small trees. Leaves opposite or in whorls of 3 or 4, evergreen. Inflorescence terminal, corymbose. Corolla cylindrical below, infundibuliform above, the throat wide and open, with 5 large lacinate scales; lobes overlapping to the right in bud. Anthers appendaged, adhering to the stigma. Disc absent. Follicles united until just before dehiscent. Seeds numerous, tomentose, apically coriaceous.

1. *N. oleander* L.

Plate XXXIX

Oleandra
Oleander

Stems up to 3 m. high. Leaves c. 8-15 x 2-3 cm., linear-lanceolate, acute, coriaceous. Calyx densely glandular inside. Corolla (2-) 3-4 cm. in diameter, showy, usually pink; tube 2 cm. long; the lobes 2 cm. long, obtuse, spreading. Anther appendages long, hairy, twisted. Follicles c. 10 x 1 cm., erect. Fl. 4-10.

Malta: cultivated extensively in gardens and on roadsides as at Rabat, St. Andrews (Haslam; Wolseley); Marfa, Ghejra (Wolseley); sometimes naturalised (Borg). Gozo: Xaghra, Nadur and elsewhere (Wolseley).

Mediterranean region.

2. Vinca L.

Low creeping dwarf shrubs or herbaceous perennials, usually with trailing vegetative shoots and ascending flowering stems. Leaves opposite. Flowers solitary in leaf-axils, long-pedicellate. Calyx lobes more than $\frac{1}{2}$ as long as corolla-tube. Corolla hypocrateriform, usually blue (rarely reddish-purple, pink or white), the tube gradually widened, without conspicuous appendages but with a zone of hairs above the insertion of the stamens and a low ridge connecting the lobes at the mouth; lobes oblique, as long as the tube, overlapping to the left in bud. Stamens inserted half-way to the corolla-tube; filaments bent abruptly at base; anthers with the connective expanded above into a flap-like appendage. Carpels with 4-8 ovules, alternating with 2 disc-scales. Follicles patent. Seeds glabrous.

Greater Periwinkle

1. *V. major* L.

Stems up to 100 cm., ascending in the lower part, then arching or procumbent, overwintering. Leaves 2.5-9 x 2-6 cm., mostly ovate or broadly ovate (rarely lanceolate), evergreen, the margins ciliate with hairs 0.1-1 mm. long. Flowering stems up to 30 cm. high; pedicels shorter than the subtending leaves. Calyx lobes 7-17 mm. long, very narrowly triangular, the margins densely ciliate with hairs 0.5-1 mm. long. Corolla tube 12-15 mm. long; limb 30-50 mm. in diameter, usually bluish-purple; lobes obliquely truncate. $2n = 92$. Fl. 3-6.

Malta: cultivated in gardens and often naturalised (Borg).

W. & C. Mediterranean region; frequently naturalised elsewhere.

LXXV. ASCLEPIADACEAE

Shrubs or perennial herbs, sometimes with twining stems. Leaves usually opposite, simple, exstipulate, sometimes scale-like. Flowers in axillary or terminal cymes or umbels, actinomorphic, 5-merous. Corolla lobes contorted or valvate in bud. Filaments with a single or double corona of 5 or 10 free or more or less united segments inserted at or near the base; anthers united in a ring and usually adnate to the stigma, forming a gynostegium. Pollen in pollinia, rarely in tetrads. Carpels 2, free below, united at the stigma. Fruit a pair of follicles, though often only one developing. Seeds comose at apex.

Corona single, with 5 segments
Corona double, with 10 segments

1. *Periploca*
2. *Cynanchum*

1. Periploca L.

Shrubs, usually with more or less twining stems. Leaves opposite. Flowers in axillary cymes. Corolla contorted in bud; lobes more or less erect at anthesis. Corona single, with 5 free, abaxially awned segments. Anthers adjacent to, but not adnate to the stigma, opening by longitudinal slits. Follicles cylindrical, slightly sulcate, not spiny.

1. *P. laevigata* Aiton

Plate XXXIV

Sigra tal-harir
Wolfbane

Stems 1.5-3 m. high, erect, sometimes twining at apex. Leaves 1.5 x 0.2-0.6 cm., subsessile, oblanceolate to linear, more or less obtuse, cuneate at base, glabrous, somewhat coriaceous, subsessile. Cymes few-flowered. Corolla c. 1 cm. in diameter; lobes oblong, obtuse, green outside, green, purple-brown and white inside; margins not deflexed at anthesis. Arms of corolla deflexed, green. Anthers smooth. Follicles 5-10 cm. long. Seeds c. 7 x 3 mm., coma c. 40 mm. long. Fl. Spring and Autumn.

Cliffs and dry rocky places. Malta: local (G. Lanfranco), as at Wied Babu and cliffs overlooking Ghar Lapsi (S. & C.G.; Borg; Wolseley); Wied Inčita, Wied il-Ghasel, Dingli (S. & C.G.; Borg); Mistra, cliffs below Hagar Qim (Wolseley); Gozo: Ta' Conè (Gulia; Borg); Xlendi, Mgarr ix-Xini (Borg; Wolseley); Chambray, Ta' Gurdan (Borg); West of Ta' Rieñu (Wolseley).

C. and E. Mediterranean region.

2. Cynanchum L.

Woody climbers. Leaves opposite, herbaceous. Flowers in axillary and terminal umbels. Corolla contorted in bud; lobes patent at anthesis. Corona double, with 10 free segments. Anthers adnate to stigma, opening apically. Follicles fusiform, smooth.

1. *C. acutum* L.

Hairless Cynanchum

Glabrous. Stems up to 3 m. high, slender, twining. Leaves 2-15 x 1.5-10 cm., petiolate, ovate, sagittate, acute; petioles 1-5 cm. long. Umbels few to many-flowered; peduncles 1-6 cm. long. Corolla 7-12 mm. in diameter, white or pink, glabrous; lobes c. 5 x 1 mm., linear, subacute. Corona-segments triangular. Follicles c. 8 x 1 cm. Fl. 6-8.

Malta: very rare, Marsaskala (Gulia; Borg).

Mediterranean region; W. Asia.

LXXVI. RUBIACEAE

Herbs or dwarf shrubs. Leaves opposite or in whorls of 4-12, stipulate, the stipules sometimes leaf-like, simple, entire. Flowers in spikes, heads, cymes, corymbs or panicles, hermaphrodite or male. Calyx 4- or 5(-6)-toothed, or absent. Corolla 3- to 5-lobed, actinomorphic, rotate, infundibuliform or hypocrateriform. Stamens 4-5, epipetalous on the corolla-tube and alternating with the lobes. Ovary inferior, usually 2-locular; ovules 1 to numerous per locule; styles simple or 2-fid. Fruit fleshy or dry, dividing into 1-2 mericarps. Seeds endospermic.

1. Leaves opposite with small stipules; dwarf shrub
Leaves and leaf-like stipules in whorls of 4 or more
2. Corolla tube longer than lobes
Corolla tube equalling or shorter than lobes
3. Flowers in dense spikes, usually with only 1 sessile
flower in the axil of each bract
Flowers in cymes, panicles or heads
4. Calyx present, 4- to 6-toothed, persistent in fruit
Calyx an indistinct annular ridge
5. Leaves and stipules setaceous, unequal
Leaves and leaf-like stipules equal and not setaceous
6. Corolla 5-lobed; fruits black and fleshy
Corolla 4-lobed; fruits usually dry, not black
7. Leaves and leaf-like stipules in whorls of more than
four
Leaves and leaf-like stipules in whorls of 4

1. *Putoria* Pers.

Dwarf shrubs. Leaves opposite; stipules 2, small, free. Flowers in small heads. Calyx 5-toothed, persistent in fruit; corolla with a long tube and 5 lobes; stigmas filiform. Fruit fleshy, 2-locular with 1 seed in each loculus.

1. *P. calabrica* (L. fil.) Pers. Plate XXXV Stinking Madder

Much branched, forming mats up to 1 m. in diameter, foetid, glabrous to densely puberulent. Leaves 10-20 x c. 3 mm., obovate to elliptic-lanceolate, obtuse, with revolute margins; stipules c. 1 mm. long, ovate. Corolla 10-15 mm. long, pink, the lobes 3-4 mm. long, linear-lanceolate. Fruit c. 5 mm. long, black, Fl. 5-6. Rocky valleys, *Malta*; very rare (G. Lanfranco), at Wied il-Ghasel (S. & C.G.; Borg; Wolseley); *Selmun* (I. Evans). *Comino*: San Niklaw Bay (Gauci). Mediterranean region.

2. *Sherardia* L.

Annuals. Leaves in whorls of 4-6. Flowers in small terminal heads, with up to 10 connate leaves forming an involucre. Calyx 4- to 6-toothed, persistent in fruit. Corolla with a long tube and 4 lobes; stigmas capitate. Fruit dry, composed of 2, 1-seeded mericarps.

1. *S. arvensis* L. Plate XXXV Harxajja tal-ghelieqi
Field Madder

Stems up to 40 cm. long, procumbent, somewhat scabrid with small deflexed prickles. Lower leaves obovate-cuspidate, soon dead; upper leaves 5-20 x 1-5 mm., oblanceolate, mucronate. Heads 4- to 10-flowered. Corolla 4-5 mm. long, lilac. Fruit 2-7 mm. in diameter, scabrid. $2n = 22$, Fl. 2-5.

Cultivated ground and rocky hollows. *Malta*, *Gozo* and *Comino*: very common everywhere (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Cominotto*: (Borg). *Filfa*: S. & C.G.; Borg).

Almost throughout Europe; N. Africa; W. Asia.

1. *Putoria*

3. *Crucianella*

2. *Sherardia*

4. *Asperula*

5. *Galium*

7. *Rubia*

5. *Galium*

6. *Valantia*

3. *Crucianella* L.

Annual or woody perennials. Leaves and leaf-like stipules in whorls of 4-6 or more. Inflorescence a spike; flowers hermaphrodite, usually single and sessile, or very shortly pedunculate, in the axils of a bract and subtended by two bracteoles at the base. Calyx absent. Corolla infundibuliform; tube narrow, 3-6 times as long as the 4-5 lobes; lobes usually with incurved awn at apex. Style bifid; branches unequal; stigma capitate. Fruit dry, glabrous, smooth to tuberculate; mericarps usually 2, narrowly ovoid, 1-seeded.

Perennial, woody at base; spike 1-3 cm. high
Annual; spike 15(-25) cm. high

1. *maritima*
2. *latifolia*

1. *C. maritima* L. Plate XXXV
C. rupestris Guss.

Sea *Crucianella*

Procumbent-ascending woody perennial; stems 10-50 cm. long; whitish, glabrous, smooth. Leaves and leaf-like stipules 4-10 x 1-4 mm., in whorls of 4, ovate-lanceolate, mucronate, coriaceous and white-margined, often densely imbricate, somewhat pungent. Spike 1-3 cm. high; bracts 6-10 x 3-7 mm., ovate, free; bracteoles shorter than bracts, plicate, more or less connate at base. Corolla 10-13 x 2-3 mm., 5-lobed, yellow, exceeding the bract. $2n = 22$. Fl. 4-6.

Maritime rocks and sands. *Malta*: frequent (G. Lanfranco), as along the coast from St. Julians to Mellieha (S. & C.G.; Borg; Wolseley); *Mtaleb* (S. & C.G.; Borg); *Marfa* ridge, *Gnejna*, *Wied Babu* (Borg; Wolseley); *Ghajj Tuffiġna*, *Bahrija*, *Dingli* and elsewhere (Borg). *Gozo*: *Dwejra*, *Marsalforn*, *Ta' Ċeniġ* (S. & C.G.; Borg; Wolseley); *Mgarr ix-Xini*, *Qala*, *Qbajjar*, *Ramla* (Borg). *Comino*: (Borg; Wolseley). *Cominotto*: (Duthie; Borg).

W. Mediterranean region and Iberian peninsula.

2. *C. latifolia* L. Broad-leaved *Crucianella*

Annual. Stems 8-30 cm. long, slightly puberulent-scabrid. Leaves and leaf-like stipules 10-25 x 1-4 mm., in whorls of 4-6, the lowermost obovate-elliptical, the upper lanceolate to linear, with revolute margins. Spike 15(-25) cm. x 1.5-2.5 mm.; internodes (3-) 4-4.5(-5) mm. long, bracts 5-8 x 2-3 mm., ovate-lanceolate, acuminate, strongly appressed, their base somewhat inflated and with enlarged epidermal cells, more or less connate by a hyaline membrane; bracteoles linear, much narrower and shorter than bracts; flowers sessile. Corolla 5-7.5 x c. 0.8 mm., 4-lobed, yellowish, somewhat exceeding the bracts.

Malta: *Slima* according to *Delicata* (Borg).

Mediterranean region.

4. *Asperula* L.

Annual to perennial herbs or dwarf shrubs. Stems more or less distinctly 4-angled and not retrorsely aculeolate. Leaves in pairs or in whorls of 4-6. Inflorescence of panicles or capitula; ultimate branches with bracts and sometimes bracteoles. Flowers hermaphrodite, 3-4 (-5)-merous. Calyx absent or consisting of short teeth. Corolla usually hypocrateriform to infundibuliform. Stigmas capitate. Ovary and fruit oblong to globose, never with hooked hairs; fruit dry.

Corolla-tube 2-3 times as long as lobes
Corolla-tube 1-2 times as long as lobes

1. *aristata*
2. *cynanchica*

1. *A. aristata* L. fil.
A. cynanchica var. *aristata* (L. fil.) Fiori

Southern Squinancywort

Non-flowering shoots green or grey-green, woody at base or herbaceous. Stems 10-60 cm. high, often shortly papillose-hairy below, usually subglabrous above. Leaves 13-40 x 0.5-2 mm., lanceolate to linear, with short hyaline apex usually 0.1-0.2 mm. Inflorescence freely branched; bracts free. Corolla hypocrateriform to narrowly infundibuliform; tube (1½ -) 2-3 (-4) times as long as lobes. Fruit papillose, rarely hairy.

Among low shrubs. *Malta*: rare (G. Lanfranco), as at Wied Inčita, Wied Musta (Borg).

S. Europe; N. Africa.

2. *A. cynanchica* L.
 incl. var. *longiflora* (Waldst. & Kit.) Borg

Squinancywort

Mostly more or less laxly caespitose, green, rarely glaucous-pruinose, with more or less numerous non-flowering shoots, but without subterranean stolons. Stems 10-50 cm. high, ascending to erect, herbaceous at base, usually rough with short hairs at base, subglabrous above; middle internodes 1-3 times as long as leaves. Leaves (13-) 20-35 (-40) x 0.8-1.5 mm., in whorls of 4 throughout, narrowly lanceolate to linear, acute; midrib comprising less than ¼ of width of leaf; margin flat to weakly revolute. Inflorescence usually much-branched; pedicels 0.1 mm. long. Corolla 2.5-3.5 (-4) mm. long, broadly infundibuliform, pale purplish to whitish, usually more or less rough; tube 1-1½ (-2) times as long as lobes; lobes distinctly appendiculate. Fruit 1.5-2 mm., papillose, rarely hairy. 2n = 20, 40. Fl. 1-11.

Rocky arid places. *Malta* and *Gozo*: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Throughout Europe except the north; Caucasus.

5. *Gallium* L.

Like *Asperula* but stems sometimes terete, sometimes retrorsely aculeolate; ultimate branches of inflorescence often without bracts, always without bracteoles; pedicels often longer than ovary or fruit; flowers usually hermaphrodite, 3- to 4-merous; corolla rarely infundibuliform, usually cup-shaped or rotate; ovary and fruit ovoid, sometimes with hooked hairs; fruit dry, rarely fleshy.

Descriptions of leaves refer both to the leaves and to the leaf-like stipules with which they are associated.

1. Leaf-margin with forwardly-directed projections
 Leaf-margin retrorsely aculeolate

2.
 3.

2. Leaves 1.5-5 mm. wide; partial inflorescence mostly 2-flowered; corolla greenish-white to white; fruits 4-6 mm.
 Leaves 0.8-2.5 mm. wide; partial inflorescences 1-2 flowered; corolla yellowish; fruits 1.3-1.5 mm.

4. *verrucosum*

5. *murale*

3. Leaves glabrous above; peduncles and pedicels convergent and deflexed after anthesis; fruit verrucose
 Leaves shortly hairy above; peduncles and pedicels divaricate after anthesis, straight (or only bent just

3. *tricornutum*

beneath the fruit); fruit with hooked bristles or smooth

4.

4. Corolla 0.8-1.3 mm. in diameter; fruit (excluding rigid hairs) 2-3 mm., with rigid hairs or more or less smooth

1. *spurium*

- Corolla 1.5-1.7 mm. in diameter; fruit 3-5 mm., always with dense, hooked, rigid hairs.

2. *aparine*

1. *G. spurium* L.

Harxajja
 False Cleavers

Stems 10-100 (-160) cm., scrambling, weak to rather stout, retrorse-aculeolate, hairy at the nodes. Leaves (20-) 30-35 x 2.5-4 mm., in whorls of 6-10, narrowly oblanceolate, long-awned, more or less hairy above; margin and midrib with rigid backwardly directed projections and rigid hairs beneath, margin more or less revolute. Inflorescence narrowly ovoid to cylindrical (rarely reduced); partial inflorescences 1- to 7-flowered, longer than the leaves; peduncles and pedicels patent, straight but often sharply bent just under the fruit. Corolla 0.8-1.3 mm. in diameter, greenish-white, glabrous; lobes acute. Fruits 2-3 mm., smooth (var. *spurium*) or with dense hooked hairs without tuberculate bases (var. *vallantii* (DC.) Gren). 2n = 20. Fl. 3-5.

Malta and *Gozo*: frequent (Borg; G. Lanfranco).

Most of Europe; N., W. & C. Asia.

2. *G. aparine* L.

Plate XXXV

Harxajja
 Cleavers

Like *G. spurium* but stems (20-) 20-120 cm. high, often stout and more hairy at the nodes; leaves 30-50 x 3-8 mm., in whorls of 6-9, narrowly to widely oblanceolate, very abruptly contracted at the apex (especially the lower); corolla 1.5-1.7 cm. in diameter, white; fruits 3-5 mm., with dense hooked hairs with swollen bases. 2n = 42, 44, 48, 62, 66, 68. Fl. 3-5.

Valleys and cultivated places, especially orchards. *Malta* and *Gozo*: frequent (S. & C.G.; Borg; Wolseley).

Throughout most of Europe; N. & W. Asia.

3. *G. tricornutum* Dandy

G. tricornutum Stokes pro parte

Harxajja
 Corn Cleavers

Stems 10-80 (-100) cm. high, scrambling stout, retrorse-aculeolate and very rough. Leaves 10-40 x 2.5-8 mm., in whorls of 6-8, narrowly oblanceolate, long-awned, glabrous above, margin and midrib with rigid, retrorse projections beneath, the margin not revolute. Inflorescence long; partial inflorescences (1-) 3- to 5(-7)-flowered, scarcely longer than the leaves; peduncles (5-) 8-15(-20) mm. long, pedicels 1-8 mm. long, curved distinctly inwards and downwards after flowering. Flowers hermaphrodite, the lateral often male. Corolla 1-1.7 mm. in diameter, glabrous, white; lobes with a long acute apex. Fruits 3-5 mm., with numerous acute papillae. 2n = 44. Fl. 3-4.

Valleys and cultivated places. *Malta* and *Gozo*: common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

S., W. & C. Europe; S.W. U.S.S.R.; Mediterranean region; casual in north and east Europe.

4. *G. verrucosum* Hudson
G. saccharatum All.; *G. valantia* Weber

Harxajja
 Southern Cleavers

Stems 5-50 cm. high, erect to ascending, with retrorse projections. Leaves 5-17 x 1.5-5 mm., in whorls of 5-6(7), lanceolate, awned, glabrous above; margin and midrib beneath with rather stiff forwardly directed projections, the margins not revolute. Inflorescence oblong; partial inflorescences mostly 3-flowered, shorter than the leaves; pedicels 1-3 mm. long, deflexed after flowering. Central flowers of the cyme hermaphrodite, the lateral male. Corolla (1-) 2-2.5 mm. in diameter, greenish-white to white, glabrous; lobes acute. Fruits 4-6 mm., prominently verrucose. $2n = 22$. Fl. 1-5.

Cultivated and waste places. *Malta* and *Gozo*: very common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region; naturalised in C. Europe.

5. *G. murale* (L.) All.

Harxajja safra.
 Yellow Bedstraw

Stems 5-20 cm. high, procumbent or ascending from a much-branched base, usually without long lateral branches above, smooth or with retrorse projections, also with patent hairs above. Leaves 4-10 x 0.8-2.5 mm., in whorls of 4-6, widely to narrowly oblanceolate, shortly awned, pubescent or glabrescent. Inflorescence cylindrical, few-flowered, with 1-4 flowers in each whorl, in 2-flowered partial inflorescences or solitary; pedicels 0.5-1.5 mm. long, shorter than the bracts, deflexed after anthesis. Corolla c. 0.7 mm. in diameter, yellowish, glabrous, or somewhat hairy externally; lobes acute. Fruit 1.3-1.5 mm., cylindrical, curved and separated from one another, often unequal, and with hooked, rigid hairs especially towards the apex, rarely glabrous. $2n = 44$. Fl. 3-4.

Arid, rocky places. *Malta*, *Gozo* and *Comino*: common (S. & C.G.; Borg; Wolseley).

Mediterranean region.

6. *Valantia* L.

Herbaceous perennials or annuals. Leaves and leaf-like stipules in whorls of 4, with 1 main vein only. Inflorescence leafy, narrow, hardly branched, with whorls of short, axial, 3-flowered cymes; central flower hermaphrodite with 4-lobed corolla, lateral flowers male with 3-lobed corolla. Peduncles and pedicels reflexed between leaves and stipules, coalescing, enlarging and encircling fruit, with bristles or hooks on outside. Calyx absent. Corolla whitish, rotate; stigma capitate. Fruit dry, papillose or glabrous; mericarps 1-2, usually remaining within peduncle and pedicel cavity.

Lower internodes up to 25 mm. long, hispid
 Lower internodes up to 12 mm. long, glabrous or pubescent

1. *V. hispida* L.

Plate XXV

Hairy Valantia

Annual. Stems 6-20 cm. high; lower internodes up to 25 mm. long, much abbreviated in inflorescence, more or less scabrid-hispid, particularly above. Leaves and stipules 6-10 x 2-3.5 mm., narrowly obovate to oblanceolate, usually strongly mucronate. Peduncle and pedicels broadly coalescent, usually strongly thickening, tightly encircling the fruit, dorsally with about 15-25 straight bristles. Hermaphrodite flowers 1.5-2 mm. in diameter, more or less cup-shaped. Fruit usually 2, 1.1-1.4 mm. in diameter, papillose. $2n = 18$. Fl. 3-4.

Gozo: Ramla Bay (Duthie; S. & C.G.; Borg). *Comino*: (Borg). *Cominotto*: (Duthie).
 Mediterranean region; W. Asia to Ethiopia.

1. *V. muralis* L.

Plate XXXV

Wall Valantia

Differs from *V. hispida* in plant being smaller, stems usually not more than 15 cm. high, internodes up to about 12 mm. long, glabrescent, more or less pubescent only towards the apex; leaves and stipules 3-6.5 x 2.25 mm., obtuse; peduncle and pedicels coalescent and strongly thickening, dorsally with conspicuous horn; horn and pedicels with hooked bristles; hermaphrodite flowers 1.0-1.6 mm. in diameter; fruit usually 1, 1.0-1.2 mm. in diameter, smooth. $2n = 18$. Fl. 2-5.

Walls, rocky ground and dry waste places. *Malta*, *Gozo* and *Comino*: very common (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Cominotto*: (Duthie; Borg). *Selmoneit*: (Borg).

Mediterranean region.

7. *Rubia* L.

Perennials. Leaves in whorls of 4-6, at least above, with small prickles on the margin and midrib beneath. Flowers in axillary cymes or panicles. Calyx minute or absent; corolla with short tube and usually 5 lobes; stigma capitate. Fruit fleshy, usually with only one 1-seeded mericarp developing.

1. *R. peregrina* L.

Plate XXXV

Harxajja saivagga
 Wild Madder

Stem 30-120 cm. high, climbing, glabrous or pubescent, with small deflexed prickles; lower part of stem woody and persistent. Leaves 15-60 x 3-20 mm., in whorls of 4-6, linear to broadly ovate-elliptical, coriaceous, the lateral veins obscure. Cymes 4-10 cm. high, many-flowered, exceeding the leaves. Corolla 4-6 mm. in diameter, yellowish-green; lobes 2-3 mm. long, cuspidate; anthers 0.2-0.3 mm. long, orbicular-ovate to suborbicular. Fl. 4-6.

Rocky ground and amongst shrubs. *Malta*: locally frequent (S. & C.G.) as at Buskett, Ahrax, Mellieha, Gnien Ingraw, Ghajn Tuffieha, Majesa, Bahrija, Gnien il Kbir, Girgenti, Wied Babu, Wied Inčita, Wied il-Ghasel, Wied Filep (Borg). *Gozo*: Xlendi, Mgarr ix-Xini, Gnien Xibla, Nadur (Borg).

Mediterranean region; W. Europe.

LXXVII. CONVULVULACEAE

Herbs or shrubs. Stem often climbing. Leaves alternate, exstipulate. Flowers actinomorphic, hermaphrodite, in terminal or axillary inflorescences, sometimes solitary. Sepals 5, usually free. Corolla infundibuliform, tubiform or campanulate, usually 5-lobed or angled. Stamens 5, alternating with corolla-lobes. Ovary 1- to 4-locular; ovules 1 or 2 in each locus; style terminal. Fruit a capsule. Seeds endospermic.

1. Plant a twining parasite with haustoria, not green,
 more or less glabrous
 Plant free-living, green or covered with hairs

4. *Cuscuta*

2.

2. Corolla 3-5 mm. in diameter, divided to about halfway
Corolla more than 5 mm. in diameter, scarcely lobed

3. Bracteoles broad, leaf partly obscuring the sepals
Bracteoles lanceolate to filiform, not or scarcely obscuring the sepals

4. Stigma with 2 filiform to cylindric-clavate lobes; pollen grains tricolpate, more or less smooth
Stigma with 1-3 globose lobes; pollen grains pantoporate, spinous

1. Calystegia R.Br.

Perennial rhizomatous herbs; stems twisting or climbing. White latex present. Leaves petiolate, variously lobed at base. Flowers solitary, axillary, with a pair of large and sometimes inflated bracteoles partly or entirely concealing the sepals. Corolla large, funnel- or trumpet shaped, glabrous or ciliate. Ovary glabrous, unilocular; ovules 4. Stigma bilobed; lobes swollen and elongate. Pollen grains pantoporate; exine more or less smooth.

1. Stems not or weakly twisting, procumbent; leaves reniform
Stems strongly twisting and climbing; leaves not reniform

2. Bracteoles rarely more than 15 mm. wide, not overlapping, flat or keeled at the base; corolla rarely more than 50 mm. in diameter; stamens up to 23(25) mm. long
Bracteoles 15-40 mm. wide when flattened, overlapping, more or less saccate at the base; corolla 50-90 mm. in diameter; stamens 24-37(40) mm. long

1. C. soldanella (L.) R. Br.

Glabrous. Stems up to 50(100) cm. long, procumbent, not or weakly twisting. Leaves 1-2 times as wide as long, reniform, somewhat fleshy; apex very broadly obtuse or emarginate. Bracteoles ovate to suborbicular, flat or sometimes tending to enfold the calyx. Corolla 32-35 mm. in diameter, pink. Stamens 20-30 mm. long, anthers 4-6 mm. long. $2n = 22$. Fl. 4-5.

Malta: very rare (G. Lanfranco), on maritime sands at Marfa near Torri tal-Armier and Qala tal-Qartin (S. & C.G.; Borg); Ahrax (Borg).

Coast of a large part of the world.

2. C. sepium (L.) R. Br.

Plate XXXIV

Leblieb kbir
Hedge Bindweed

Glabrous or pubescent. Stems strongly twisting and climbing. Leaves more or less sagittate; sinus with divergent sides. Peduncle without a narrow repand wing. Bracteoles 10-30 x 5-20 mm., not or rarely scarcely overlapping, the sides not closely investing the calyx, acute or rarely subotuse at the apex, flat or keeled at the base. Corolla 30-70 mm. in diameter, white or pink. Stamens 15-30 mm. long; anthers 4-6.5 mm. long. $2n = 22$. Fl. 5-6.

Malta: shaded walls and water channels, Buskett (Borg; Wolseley).

Widely distributed in temperate regions.

3. Cressa

1. Calystegia

2. Convolvulus

5. Ipomoea

3.

4.

3. C. silvatica (Kit.) Griseb.

Great Bindweed

Convolvulus sepium var. *inflatus* Desf.

Glabrous. Stems strongly climbing. Leaves more or less sagittate; sinus rounded with divergent or occasionally parallel sides. Peduncle without a narrow repand wing. Bracteoles 14-32(38) mm. wide when flattened, overlapping, closely investing the calyx and almost completely concealing it, weakly to strongly saccate at the base, subacute to broadly rounded or emarginate at the apex. Corolla usually 50-90 mm. in diameter, white; occasionally the outside of the centre-band only of each lobe suffused with pink. Stamens 4-37(40) mm. long; anthers 6-8 mm. long. $2n = 22$. Fl. 5-6.

Malta: Gniien il-Kbir (Borg).

Mediterranean region; widely naturalised in Europe.

2. Convolvulus L.

Annual or perennial herbs or small shrubs up to 100 cm. high; stems erect, trailing or twining, sometimes with latex. Leaves simple, usually entire, alternate. Flowers solitary or in terminal or axillary inflorescences with 2 minute to leafy bracteoles. Corolla funnel-shaped, glabrous except for five external usually pubescent stripes often of a different colour. Stamens inserted on the base of the corolla tube, included; filaments dilated and often glandular; pubescent proximally. Ovary 2-locular; ovules 2 in each loculus; stigma 2-lobed, the lobes filiform to cylindric-clavate. Capsule usually 4-seeded, 1-to 2-celled. Pollen grains tricolpate, exine not spinous.

1. Leaves very abruptly narrowed into a distinct petiole
Leaves sessile or gradually tapered into a petiole

2. Upper leaves and bracts very deeply divided
Upper leaves and bracts not divided

3. Annual or short-lived perennial; corolla up to 12 mm. long, blue
Perennial with stout often woody rootstock; corolla 0.25 mm. long, white to pink

4. Annuals and short-lived perennials, entirely herbaceous
Perennial; shoots woody below, herbaceous above

5. Corolla 15-40 mm. long
Corolla 7-10 mm. long

6. At least lowest part of stem with mostly patent hairs
Shoots sericeous, sometimes with some patent hairs

7. Extreme base of leaves at base of their stem scarcely broadened and scarious
Extreme base of leaves at base of main stem broadened and scarious

1. C. oleifolius Desr.

Pink Bindweed

C. cneorum sensu Borg

Densely sericeous, erect or spreading, branched perennial 5-30 cm. high, woody in the lower parts. Leaves filiform to linear, attenuate at base, herbaceous and

scarcely broadened at the extreme base. Flowers in terminal heads, often diffuse and branched; peduncles absent or very short, usually hidden. Outer sepals lanceolate to broadly ovate, obtuse to sharply acuminate, inner acuminate to cuspidate. Corolla 13-25 mm. long, usually pink. Capsule shorter than calyx when ripe. Fl. 3-10.

Open ground not far from the sea. *Malta*: locally frequent (G. Lanfranco; Wolseley) as at Gnejna, Ghajn Tuffieha, Mtahleb, St. Paul's Bay, Mistra, Mellieha, Bahrija, Wied Gerzuma (Borg). *Gozo*: Xaghra, Nadur, Qala (Borg) and elsewhere (Wolseley).

E. Mediterranean region.

2. *C. lineatus* L.

Leblieb abjad
Narrow-leaved Bindweed

Densely sericeous perennial 3-25 cm. high, with woody stock and usually procumbent or ascending herbaceous stems. Leaves linear to elliptical or oblanceolate, attenuate at base, basal leaves on each shoot broadened and scarious at the extreme base. Peduncles terminal and axillary, much shorter than bracts, 1- to several-flowered. Outer sepals linear to lanceolate, convex on the back below, cuneate to rounded at base, acute to acuminate. Corolla 12-25 mm. long, pink. Ovary and capsule pubescent. Fl. 3-6.

Arid waste ground near the sea. *Malta*: frequent on the N.E. side of the Island (S. & C.G.; G. Lanfranco; Borg); Bahar it-Caghaq (Penza). *Gozo*: abundant in many places (S. & C.G.; Borg; Penza). *Comino*: (S. & C.G.).

Mediterranean region; W. & C. Asia.

3. *C. cantabrica* L.

Southern Bindweed

Pubescent perennial (with many patent hairs at least below) with woody stock and erect herbaceous stems 10-50 cm. high. Leaves scarious at the extreme base. Peduncles terminal and axillary, the lower longer than subtending bracts, 1- to several-flowered. Outer sepals lanceolate to oblanceolate, convex on the back below, cuneate to rounded at base, acute to acuminate. Corolla 15-25 mm. long, pink. Ovary and capsule pubescent. $2n = 30$. Fl. 4-6.

Rocky plateaus. *Malta*: Mtahleb (G.D.; S. & C.G.; Borg); Ghajn Tuffieha (Borg); Ghemieri (Haslam).

Mediterranean region.

4. *C. tricolor* L.

Leblieb ikhal
Three-coloured Bindweed

Herbaceous annual or short-lived perennial up to 60 cm. high. Leaves sessile, mostly obovate to oblanceolate. Peduncle and pedicel together several times longer than calyx, 1-flowered. Sepals with distinct distal and proximal regions, pubescent, herbaceous, obtuse to acuminate. Corolla 15-40 mm. long, usually with basipetally zoned blue, white and yellow bands. Capsule pubescent. Fl. 4-5.

Cultivated places; occasionally planted. *Malta*: rare (G. Lanfranco), as at Ballut, Tarxien, Zejtun, St. Paul's Bay (S. & C.G.; Borg); Marsa (S. & C.G.); Buskett, Wardija, Pwales (Borg); Wied Babu (Lanfranco).

Mediterranean region.

5. *C. pentapetaloides* L.

Leblieb zghir
Two-coloured Bindweed

Herbaceous annual or short-lived perennial up to 30 cm. high. Leaves sessile, mostly linear to oblanceolate. Peduncle and pedicel together several times longer than calyx, 1-flowered. Sepals elliptic-ovate, glabrous, obtuse and mucronate. Corolla 7-10 mm. long, usually blue distally and yellow proximally. Fl. 3-6.

Rocky uncultivated places. *Malta*, *Gozo* and *Comino*: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean Europe, W. Asia.

6. *C. siculus* L.

Leblieb tal-werqa tiegq
Blue Bindweed

Sparsely pubescent annual or short-lived perennial; stems 10-60 cm. long, slender, trailing (rarely twining), herbaceous. Leaves petiolate, lanceolate to ovate, cordate or rarely truncate, entire. Peduncles axillary, usually shorter than the bracts, 1- to 2(-) flowered. Sepals acute to acuminate, pubescent. Corolla 7-12 mm. long, blue. Fl. 3-6.

Cultivated and waste places. *Malta* and *Gozo*: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region, Atlantic Islands.

7. *C. arvensis* L.

Leblieb tar-raba'
Field Bindweed

Glabrous or pubescent perennial; stems up to 200 cm. long, slender, trailing or twining, herbaceous. Leaves petiolate, triangular or ovate-oblong to linear, hastate to sagittate, more or less entire. Peduncles axillary, often about as long as bracts, 1- to 2(-) flowered. Sepals obtuse to emarginate, and often apiculate. Corolla 10-25 mm. long, white or pink. Ovary glabrous. $2n = 50$. Fl. 3-10.

Cultivated and waste places. *Malta*, *Gozo* and *Comino*: very common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Throughout the temperate regions of both hemispheres.

8. *C. althaeoides* L.

Plate XXXIV

Leblieb roza
Mallow Bindweed

Pubescent perennial; stems up to 100 cm. long, slender, trailing or twining, herbaceous. Leaves petiolate, very variable but at least the upper deeply lobed and cordate to sagittate. Peduncles axillary, usually much longer than bracts, 1- to 3 (-5) flowered. Sepals variable, acute to rounded. Corolla 25-40 mm. long, usually pink. Fl. 3-6.

Two subspecies occur. Subsp. *althaeoides* is robust with relatively broad and shallow leaf-lobes, and sepals (7-) 8-9 (-10) mm. long. Subsp. *tenuissimus* (Sm.) Stace (*C. elegantissimus* Miller) is slender with relatively narrow, deep leaf-lobes, and sepals (6-) 7-8 (-9) mm. long.

Rocky wastes, valleys and walls of fields. *Malta*, *Gozo* and *Comino*: very common (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Cominotto*: (Duthie).

Mediterranean region; Atlantic Islands.

3. *Cressa* L.

Annual or perennial, often somewhat woody at the base. Leaves sessile, simple, entire, alternate. Flowers in short, terminal, congested racemes, with 2 small bracteoles. Corolla divided to about halfway into 5, spreading, pubescent lobes. Stamens inserted about the middle of the corolla-tube, glabrous, exserted. Ovary 2-locular; ovules 2 in each loculus; Styles 2, exserted; stigmas capitate. Capsule usually 1-seeded. Pollen grains tricolpate; exine not spinous.

1. *C. cretica* L. Plate XXXV Mediterranean Bindweed

Stems up to 30(50) cm. high, greyish-pubescent, erect or procumbent, much-branched. Leaves 2-10 mm. long, lanceolate to ovate, cordate or rounded at base, subacute to acuminate, merging into the bracts. Flowers 3-5 mm. in diameter, whitish-pink or yellow, persistent. Fl. 5-7.

Clayey and moist soils near the sea. *Malta*: infrequent (G. Lanfranco) as at Salini, Ghadira is-Saira, Bahar is-Caghaq to Dragonara Point (Borg; Wolseley); St. Paul's Bay, Bugibba, Mellieha (Borg); Ghadira (Gauci). Gozo: Marsalforn, Qbajjar, Zebbug, Wied iz-Zejt (Borg).

Mediterranean region north to S.E. Bulgaria and south to Madagascar.

4. *Cuscuta* L.

Herbaceous parasites, usually annual. Stems twining with haustoria. Leaves reduced to minute scales. Inflorescences cymose, spikelike, umbellate or capitate. Flowers (3-4) to 5-merous, small, white, yellowish or reddish. Stamens inserted in the throat of corolla-tube. Hypostaminal scales are attached at the base of the corolla-tube opposite the stamens. Ovary 2-celled, each cell containing 2 anatropous ovules. Styles free or united. Stigmas capitate or elongate. Fruit a circumscissile capsule dehiscing by an irregular or regular line near base, or remaining closed. Seeds 4 or fewer. Embryo filiform surrounded by a cartilagenous endosperm. Cotyledons rudimentary or absent.

1. *C. epithymum* (L.) L. subsp. *epithymum* Plate XXXIV Pittma *C. trifolii* Bab.; *C. alba* J. & C. Presl Dodder

Stems slender, much-branched, often reddish or purplish; flowers (2.5-) 3-4(-5) mm. (rarely 2.5 mm.) long, 5-merous, mostly sessile, sometimes shortly pedicellate; dense, globose glomerules 7-10 mm. in diameter, each glomerule with subacute bract at its base. Calyx usually shorter than corolla-tube, not fleshy; corolla lobes patent, triangular, acute, rarely acuminate, mostly shorter than campanulate tube. Stamens exserted; anthers often purplish-tinged. Scales spatulate, shorter than tube, fimbriate, connivent over the ovary. Styles (including stigmas) about as long or much longer than the subglobose ovary, exserted. Capsule circumscissile, enveloped by the corolla. Seeds c. 1 mm. in diameter. $2n = 14$. Fl. 3-4.

On various shrubs and herbs; most frequently associated with *Urginea maritima*, *Asphodelus microcarpus* and *Narcissus tazetta*; also *Thymus capitatus* and other shrubs.

Malta and Gozo: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley; Haslam). Comino: (Borg).

Almost throughout Europe, except the north; C. & W. Asia; N. Africa.

Cuscuta monogyna Vahl found on rose bushes in Attard in 1910 was probably casual (Borg).

5. *Ipomoea*

Annual or perennial herbs with long trailing or climbing stems. Leaves entire or lobed, alternate; petioles long, distinct. Flowers solitary or in axillary cymes, usually with 2 very small bracteoles. Corolla at least 25 mm. long, infundibuliform or tubiform, scarcely lobed, more or less glabrous. Ovary 2- to 4-locular; ovules usually 2 in each loculus; style filiform; stigma with 1-3 globose lobes. Capsule usually 4-seeded. Pollen grains pantoporate; exine spinous.

1. *I. acuminata* (Vahl) Roemer & Schultes Many-coloured Morning Glory Plate XXXIV

Lamina 4-16 cm. long, ovate or broadly ovate, entire to deeply 3-lobed, acuminate, cordate. Inflorescence few to many-flowered; sepals 13-22 mm. long, lanceolate, gradually tapering from near the base, uniformly finely pubescent; corolla 50-85 mm. in diameter, white, blue, pink or multicoloured, usually fading to pink.

Malta: frequently cultivated; naturalised in the Gircanti valley (Wolseley). Native of the Tropics; cultivated and naturalised elsewhere.

LXXVIII. HYDROPHYLLACEAE

Herbs or rarely shrubs. Leaves usually alternate, entire to pinnatisect, exstipulate. Flowers usually in simple or dichotomous scorpioid inflorescences, sometimes solitary, hermaphrodite, actinomorphic, usually 5-merous. Calyx deeply divided. Corolla sympetalous, infundibuliform, campanulate or rotate; lobes imbricate. Stamens as many as corolla lobes and alternating with them; anthers versatile. Ovary superior, 1- to 2-locular; ovules 2 to many on each placenta; styles 1-2; stigmas usually capitate. Fruit a capsule, loculicidal with 2 valves, loculicidal and septical with 4 valves, or irregularly dehiscent.

1. *Wigandia* Kunth

Robust perennial herbs with stinging hairs. Flowers in scorpioid inflorescences, shortly pedicellate. Calyx lobed almost to the base, without appendages between the lobes. Corolla with short, campanulate tube and rotate limb. Filaments with deflexed hairs in the lower part. Styles free to the base.

Cultivated for ornament. *Malta*: naturalised at Birzebbuga (Borg; Wolseley); St. George's Bay, Qajjinza (Borg); Wardija (Gauci).

1. *W. caracasana* Kunth Plate XXXV Wigandia

Erect, hispid herb 200-300 cm. high. Leaves c. 4.45 x 35 cm., ovate, obtuse, petiolate, coarsely crenate-serrate, yellowish pubescent beneath. Calyx lobes linear-lanceolate. Corolla c. 20 mm. long, the limb lilac, the tube white. Stamens shortly exserted. Capsule oblong-conical, slightly greyish-pubescent.

Cultivated for ornament. *Malta*: naturalized at Birzebbuga (Borg; Wolseley); St. George's Bay, Qajjinza (Borg); Wardija (Gauci).

Locally naturalized in W. Mediterranean region; native from Mexico to Columbia.

LXXIX. BORAGINACEAE

Herbs or dwarf shrubs, often hispid. Leaves alternate, exstipulate, simple. Flowers usually in scorpioid cymes, usually actinomorphic. Calyx 5-toothed or lobed. Corolla 5-lobed, cylindrical to campanulate, hypocrateriform or rotate, usually with a more or less distinct tube and limb; tube often with 5 scales, invaginations or tufts of hairs inside, sometimes with an annulus at the base. Stamens 5, inserted on the corolla and alternating with the lobes. Ovary superior, 2- or

4-locular; style usually simple, arising from between the 4 lobes of the ovary (gynobasic), rarely terminal. Fruit of 2 or 4 nutlets (rarely 1 or 3 by abortion). Seeds usually without endosperm; embryo straight or curved.

- | | | |
|--|------------------------|----|
| 1. Corolla distinctly zygomorphic
Corolla more or less actinomorphic | 5. <i>Echium</i> | 2. |
| 2. Style terminal
Style gynobasic | 1. <i>Heliotropium</i> | 3. |
| 3. Corolla tubular
Corolla rotate with short tube and longer limb | | 4. |
| 4. Nutlets fused into 2 separate pairs
Nutlets 4 | 4. <i>Cerinthe</i> | 7. |
| 5. Nutlets with a distinct pseudostrophilar ring around the base
Nutlets without a distinct pseudostrophilar ring | 6. <i>Symphytum</i> | 5. |
| 6. Corolla yellow | 2. <i>Neatostema</i> | 6. |
| 6. Corolla white or purplish | 3. <i>Buglossoides</i> | |
| 7. Nutlets with a distinct pseudostrophilar ring at base; rugose
Nutlets without a distinct pseudostrophilar ring; smooth and shiny | | 8. |
| 8. Scales at apex of tube papillose or hairy
Scales smooth, glabrous | 7. <i>Anchusa</i> | 9. |
| 9. Limb of corolla up to 3 mm. in diameter
Limb of corolla 7-9 mm. in diameter with distinct reticulate venation | 8. <i>Borago</i> | |
| | 9. <i>Myosotis</i> | |
| | 10. <i>Cynoglossum</i> | |

Subfam. *Heliotropioideae*. Style terminal, with a wide, glandular ring below the apex.

1. *Heliotropium* L.

Annual or perennial herbs, sometimes woody at the base. Flowers in terminal or pseudoaxillary, ebracteate and branched cymes. Calyx lobed usually to the base. Corolla hypocrateriform; tube usually without scales in the throat; limb lobed more or less to base, usually with teeth. Stamens included. Style included, usually very short; stigma large and disc-like, or conical to subulate, entire or 2- to 4-lobed. Fruit dry, splitting into 4 or 2 nutlets, or 1-seeded and remaining entire.

Calyx lobed to the base, not concealing the 4 free nutlets and persisting after they fall

1. *europaeum*

Calyx lobed to less than $\frac{1}{2}$ of its length, almost concealing the single seeded fruit and falling with it

2. *supinum*

1. *H. europaeum* L.

Plate XXXV

Vanilja bajda
Common Heliotrope

Annual: stems 4-40 cm. high, erect or ascending, usually branched, appressed to erecto-patent-pubescent. Leaves up to 5.5(-6.5) x 2.8 (-3.5) cm., ovate to elliptical, cuneate to almost rounded at the base, rounded to subacute at the apex, appressed pubescent; petiole up to 3.5 cm. long. Flowers scentless; sepals 1.8-3.5 x 0.4-0.8 mm., linear-oblong or narrowly triangular, irregularly patent-pubescent, usually patent soon after anthesis. Corolla 2-5 mm. long, at least the limb white, limb

2-4(-5) mm. in diameter. Anthers 0.7-1 mm. long, inserted in middle of corolla-tube. Stigma linear-subulate, deeply or shallowly divided into 2(-4) lobes at apex or rarely entire, usually glabrous. Fruit splitting into 4 nutlets, glabrous or pubescent, usually rugose. Fl. 4-10.

Weed of cultivation and waste places. *Malta* and *Gozo*: very common everywhere (S. & C.G.; Borg; G. Lanfranco; Haslam; Wolseley). *Comino*: (S. & C.G.; Borg).

S. & E. Europe; W. & C. Asia; N. Africa; naturalised elsewhere.

2. *H. supinum* L.

Dwarf Heliotrope

Annual, branched at the base, the central branch erect, the lateral procumbent. Leaves up to 3.5 x 2 cm., narrowly elliptical to suborbicular, rounded or cuneate at base, whitish-pubescent at least beneath, the veins conspicuously impressed above; petiole 0.3-1.5(-2) cm. long. Calyx 2-2.5 mm. long, lobed for less than $\frac{1}{2}$ of its length, tubular, accrescent in fruit and becoming pyriform, closely enfolding the fruit and falling with it. Corolla 2.5-3 mm. long, the limb white. Style almost as long as stigma, inserted slightly obliquely on the ovary; stigma conical, hairy, often shallowly bifid. Fruit a single one-seeded nutlet. Fl. 5-6.

Sandy ground. *Gozo*: rare at Dwejra (S. & C.G.; Borg).

S. Europe, N. & Tropical Africa; W. Asia to India.

Subfam. *Boraginoidae*: Style gynobasic, without a glandular ring.

2. *Neatostema* I.M. Johnston

Annual herbs; flowers in terminal leafy cymes, sometimes heterostylous. Calyx 5-lobed more or less to the base, accrescent. Corolla yellow, infundibuliform, tube with a ring or 5 clusters of hairs in the throat; and with an annulus at the base. Stamens inserted just above the annulus; nutlets 4, detaching completely from the gynobase, brown, tuberculate.

1. *N. apulum* (L.) I.M. Johnston
Lithospermum apulum (L.) Vahl

Plate XXXV

Yellow Gromwell

Stems 3-30 cm. high, solitary to many, erect, hispid, corymbosely branched above. Leaves up to 7 x 0.5 cm., with rigid hairs mainly on the margins; cauline linear or oblong-linear, erect, sessile, acute; basal linear or oblong-spathulate, attenuate into petiole. Cymes dense. Calyx 3.5-4 mm. long; lobes linear, acute, hispid outside, softly white-hairy inside, triangular in fruit. Corolla 6-6.5 mm. long; tube slightly exceeding calyx; lobes of limb glandular-puberulent on both surfaces. Styles 0.25-0.5 mm. long. Nutlets 1.5-7.75 mm., subtetrahedral, contracted at the beak, flat dorsally, keeled ventrally. $2n = 28$. Fl. 3-4.

Arid, rocky places. *Malta*: rare. Kordin. Mtahleb, Wardija, St. Andrews (Borg); Ghar il-Kbir (Wolseley); Ghajn l-Istas (Kramer and Westra); Qala Hill (G. Lanfranco).

Mediterranean region.

3. *Buglossoides* Moench

Annual or perennial herbs or dwarf shrubs; flowers in terminal, leafy cymes, sometimes heterostylous. Corolla white, blue or purple, infundibuliform or hypocrateriform, with 5 longitudinal bands of hairs inside; tube without invagi-

nations and a sometimes discontinuous annulus at the base. Stamens included, inserted at middle to base of throat. Style simple, gynobasic; stigma 2-lobed. Nutlets 4, detaching completely from the gynobase, usually smooth, sometimes tuberculate, white and shining.

1. *B. arvense* (L.) I.M. Johnston subsp. *arvense* Plate XXXV Corn Cromwell
Lithospermum arvense L.

Annual; stems 10-50 (-90) cm. high, solitary, usually erect, sometimes branched, sparsely hispid. Cauline leaves up to 9 (-10) mm. wide, oblong, obovate-oblong or obovate-spathulate to linear, crowded, the others oblong to linear, acute or sub-acute, usually erect. Cymes solitary or paired. Calyx lobes linear or linear-lanceolate, unequal, acute. Corolla (4-) 6-9 mm. long, white with a blue zone at about the middle of the tube, rarely purplish. Stamens inserted below the middle of the corolla tube. Pedicels cylindrical in fruit. Nutlets brownish, hard. Fl. 1-5.

Fields in agricultural areas. *Malta* and *Gozo*: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Most of Europe; Asia to N.W. India.

4. *Cerinth* L.

Annual, biennial or perennial herbs, glabrous or glabrescent but often with white tubercles, usually more or less glaucous. Flowers in terminal, usually branched, bracteate cymes. Calyx lobed halfway to base or more into equal or unequal lobes, accrescent. Corolla yellow, usually tinged with violet or red, actinomorphic, more or less tubular, without scales; tube about as long as limb; limb with lobes shorter than or almost as long as the rest of the corolla. Stamens included or slightly exserted; filaments inserted at apex of tube; anthers appendiculate at base. Style gynobasic, usually exserted; stigma capitate or emarginate. Nutlets fused in two separate pairs, each pair ovoid, dark brown or blackish, shiny, slightly beaked, smooth, with a flat base.

1. *C. major* L. Plate XXXVI Large *Cerinth*

Annual; stems 15-60 cm. high. Lower leaves obovate-spathulate, petiolate, ciliate, tuberculate; the upper ovate-lanceolate, cordate at base. Bracts ovate, subcordate at base, often reddish-glaucous, equalling or longer than calyx. Calyx lobes acute, ciliate. Corolla 15-30 x 5-8 mm., slightly saccate, straight, yellow with a reddish-brown ring in the throat, sometimes cream distally, or dark red throughout, more than twice as long as calyx; lobes ovate, sharply recurved at apex. Nutlets blackish, $2n = 16$.

Damp or shady places. *Malta*: locally abundant as at Wied Qirda (G. Lanfranco), Wied iż-Żurriq, Mellieħa, Aħrax (Borg); Wied Inċita; Wied Babu, Buskett, Gnejna (Borg; Wolseley); Floriana, Mistra Valley (Haslam); Wied il-Għasel, valleys of the Victoria Lines, Nigret, Fiddien (Wolseley).

Mediterranean region.

5. *Echium* L.

Annual, biennial or perennial, usually stout, hispid herbs or shrubs. Indumentum of tubercle-based rigid hairs and usually short, appressed or patent hairs. Inflorescence of spike-like or paniculate, unilateral bracteate cymes, often much enlarging in fruit. Calyx lobed almost to the base, sometimes accrescent. Corolla blue, purple, yellow or white, broadly to narrowly infundibuliform, with straight

tube and usually oblique, open throat, more or less hairy outside; usually with an annulus of 10 minute scales or tufts of hairs, or sometimes a flange-like membrane, at the base, but without scales or invaginations above. Stamens unequal, included or exserted, inserted below middle of corolla. Style exserted; stigma capitate or bifid. Nutlets ovoid-trigonal, erect, rugose, with flat base.

- | | |
|---|-----------------------|
| 1. All stamens completely included in the corolla-tube | 2. |
| At least 1-2 stamens exserted from the corolla-tube | 3. |
| 2. Calyx 6-8 mm. long at anthesis, up to 15 mm. long in fruit with teeth 3-6 mm. wide at the base | 5. <i>parviflorum</i> |
| Calyx 5-7 mm. long at anthesis, up to 10 mm. long in fruit with teeth 2-3 mm. wide at the base | 6. <i>arenarium</i> |
| 3. Corolla flesh-coloured or yellowish- or bluish-white | 1. <i>italicum</i> |
| Corolla blue, reddish-purple or pink-carmine turning blue-purple (reddish to blue or purple when dry) | 4. |
| 4. Corolla 7-10 mm. long. | 2. <i>vulgare</i> |
| Corolla 11-40 mm. long | 5. |
| 5. Corolla subglabrous, hairy on veins and margins only; basal leaves with prominent lateral veins | 3. <i>lycopsis</i> |
| Corolla ± uniformly hairy; basal leaves without prominent lateral veins | 4. <i>sabulicola</i> |

1. *E. italicum* L. Lsien il-fart kbir
Italian Viper's-bugloss

Erect, hispid biennial 40-100 cm. high, usually with a single or a dominant flowering stem. Basal leaves 200-350 x 15-40 mm., lanceolate, with appressed, soft bulbous-based hairs; cauline leaves more or less narrowly elliptical. Inflorescence spike-like or much branched and pyramidal. Calyx 6-7 mm. long. Corolla 10-12 mm. long, very narrowly infundibuliform, yellowish- or bluish-white, with 4-5 long-exserted stamens; filaments pale. $2n = 16$. Fl. 4-6.

Roadsides in the country. *Malta*: local (G. Lanfranco), as at St. Paul's Bay, Mtahleb, Gnejna, Ġirgenti (S. & C.G.; Borg); Ta' Baldu, Wardija, Ghajn Tuffieħa, Mellieħa, Ghajn il-Kbira, Bahrija (Borg); Buskett (Penza); Bingemma Gap, Bahrija (Haslam). *Gozo*: Mgarr ix-Xini, Marsalforn (S. & C.G.; Borg); Xlendi (Borg).

C. Europe; Mediterranean region.

2. *E. vulgare* L. Viper's-bugloss

Erect hispid biennial 20-90 cm. high, with 1- to several-flowering stems. Leaves with rather soft, appressed bulbous-based hairs; the basal and lower cauline 50-150 x 10-20 mm., elliptical to lanceolate, attenuate and petiolate at base; the upper narrowly lanceolate, sessile. Inflorescence more or less spike-like to paniculate. Calyx 5-7 mm. long. Corolla 10-19 mm. long, blue to bluish violet, with 4-5 longer exserted stamens. $2n = 16, 32$. Fl. 3-4.

Malta: Wied Inċita (Delicata; Borg).

Most of Europe; W. Asia.

3. *E. plantaginaceum* L.

Plate XXXVII

Lsien il-fart vjoċa
Purple Vipers'-bugloss

Erect softly hairy annual or biennial 20-60 cm. high, with 1- to many flowering stems. Basal leaves 50-140 x c. 15 mm., ovate, with prominent lateral veins and soft appressed bulbous-based hairs; cauline leaves oblong to lanceolate, the uppermost more or less cordate at the base. Inflorescence usually branched. Calyx 7-11 mm. long at anthesis, up to 15 mm. long in fruit. Corolla 18-30 mm. long, infundibuliform, purple, hairy on veins and margins only, usually with 2 exserted stamens. $2n = 16$. Fl. 3-5.

Roadsides in the country. *Malta*: rare (G. Lanfranco), as at Wied Inċita, Buskett (S. & C.G.; Borg); Rabat (S. & C.G.; Borg; Haslam; Wolseley); Mgarr (S. & C.G.; Borg; Wolseley); Bngemma (Wolseley); Ta' Qali (Gauci).

Mediterranean region extending into C. Europe; W. Asia; Atlantic Islands.

4. *E. sabulicola* Pomel

Sand Viper's-bugloss

E. conjusum de Coincy

Procumbent, ascending or erect, hispid biennial or perennial 15-50 cm. high, with several to many flowering stems. Basal leaves ovate to obovate; cauline leaves oblanceolate to spatulate, attenuate and subpetiolate at base, with more or less dense, white, appressed or patent bulbous-based hairs. Inflorescence more or less branched, laxly paniculate. Calyx 6-10 mm. long at anthesis, up to 16 mm. long in fruit, with dense white, bulbous-based hairs. Corolla 12-22 mm. long, infundibuliform, dark blue or pinkish to bluish-purple, usually with 1-2 stamens exserted; filaments sometimes sparsely hairy. Fl. 4-5.

Malta: Gnejna (Delicata; Borg).

W. Mediterranean region.

5. *E. parviflorum* MoenchLsien il-fart żgħir
Small-flowered Viper's-bugloss

Hispid annual or biennial 10-40 cm. high, with several to many ascending or erect flowering stems. Leaves with sparse to dense appressed bulbous-based hairs; the basal 55-120 x 5-25 mm., spatulate to oblanceolate, long-petiolate; the cauline obovate or oblong, the uppermost sessile. Calyx 6-8 mm. long at anthesis, up to 15 mm. long, with wide segments in fruit. Corolla 10-13 mm. long, dark blue, with all stamens included. Fl. 1-6.

Along paths, on walls and in uncultivated places. *Malta*, *Gozo*, *Comino*: very common (S. & C.G.; Borg; G. Lanfranco; Haslam; Wolseley). *Filfla*: (S. & C.G.; Borg). Mediterranean region.

6. *E. arenarium* Guss.Lsien il-fart tax-xfut
Coastal Viper's-bugloss

Hispid biennial 10-25 cm. high, with several to many ascending flowering stems. Leaves with whitish, short appressed bulbous-based hairs; the basal 30-60 x 5-14 mm., spatulate, long-petiolate; the cauline spatulate, elliptical or oblong, the uppermost sessile. Calyx 5-7 mm. long at anthesis, up to 10 mm. long in fruit, with the lobes remaining narrow. Corolla 6-11 mm. long, dark blue with all the stamens included. Fl. 2-6.

Uncultivated places and roadsides especially near the sea. *Malta* and *Gozo*: common (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Comino*: (Duthie; S. & C.G.; Borg). *Cominotto*: (Borg).

Mediterranean region; Atlantic Islands.

6. *Symphytum* L.

Perennial, usually hispid herbs. Flowers in short ebracteate terminal cymes which often elongate in fruit. Calyx campanulate, accrescent, regularly 5-lobed or 5-toothed to $\frac{1}{4}$ or almost to base. Corolla cylindrical, slightly campanulate-dilate above, with 5 short, triangular to semicircular lobes not more than $\frac{1}{5}$ as long as the rest of the corolla; scales at least twice as long as wide, with marginal papillae or hairs. Stamens included, inserted at about the middle of the corolla tube, without appendages; filaments glabrous, not more than $1\frac{1}{2}$ times as long as anthers. Style gynobasic, exserted stigma very small. Nutlets 4, ovoid, erect, sometimes curved, usually verruculose and reticulate-rugose, concave at the base with a thickened pseudostrophilar ring with small teeth on the lower margin.

1. *S. officinale* L.

Plate XXXVI

Widnet il-ghomor
Common Comfrey

Stock stout, vertical, branched. Stem (30-)50-120 cm. high, stout, erect, often branched. Leaves large, ovate-lanceolate to lanceolate, acuminate; the middle and upper sessile, often decumbent. Cymes many-flowered. Calyx lobed to $\frac{3}{4}$ - $\frac{4}{5}$, with lanceolate lobes. Corolla 12-18 mm. long, purple-violet or dirty pink or white, with short deflexed lobes. Scales broadly triangular-lanceolate, the lower marginal papillae shortly cylindric-conical, the upper much smaller and shorter, all dense. Stamens with connective projecting beyond thecae; filaments as wide as anther. Nutlets 5-6 mm. long, black, very smooth, shiny. $2n = 24, 26, 36, 40, 48$. Fl. 12-5.

Damp shady places. *Malta*: very rare, Wied Babu (GD.; Borg); Wied iż-Żurrieq (Borg).

Much of Europe.

7. *Anchusa* L.

Annual, biennial or perennial herbs, rarely woody at the base. Flowers in second racemes, bracteate usually throughout. Calyx tubular-campanulate in flower, more or less accrescent in fruit, regularly 5-lobed from $\frac{1}{2}$ almost to base. Corolla purple, blue, yellow or white, with cylindrical, straight or curved tube and rotate to campanulate limb divided into 5 equal or unequal lobes; 5 well-developed, ovate or oblong, papillose or hairy scales present at apex of tube. Anthers included or partly exserted. Nutlets 4, erect or oblique, reticulate or rugose, usually weakly and densely tuberculate; hilum basal, surrounded by a more or less thickened pseudostrophilar ring.

1. *A. azarcea* Miller
A. italica Retz.

Plate XXXVI

Lsien il-fart tar-raba
Purple Alkanet

Perennial, hispid with dense, patent, rigid or soft, often tuberculate-based hairs; stems 20-150 cm. high, erect. Leaves (50-)100-300 x (10-)15-50 mm. Cymes many; pedicels 1-3 mm. long, up to 10(-15) mm. long in fruit; bracts shorter than calyx. Calyx 6-8(-10) mm. long, up to 18 mm. long in fruit, divided almost to the base into linear, acute lobes. Corolla violet or deep blue; tube 8-10 mm. long, slightly exceeding or short than calyx; limb (8-)10-15 mm. in diameter; stamens inserted at the apex of tube, overlapping scales. Nutlets (5-)7-10 x 2-3 mm., oblong or oblong-obovoid, erect. Fl. 3-7.

Fields especially on the clay. *Malta*: locally abundant on the north and west side (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Gozo*: rare (S. & C.G.). *Comino*: Sta. Marija (Wolseley).

S. Europe, W. Asia; N. Africa; Atlantic Islands.

8. *Borago* L.

Annual or perennial herbs. Flowers in branched usually bracteate cymes; pedicels usually long, patent or deflexed in fruit. Calyx accrescent in fruit, regularly 5-lobed almost to the base. Corolla rotate to campanulate; tube short or absent; limb divided to the base into 5 lobes; scales exserted, short, emarginate, glabrous. Anthers exserted, connivent, mucronate; filaments inserted near the base of corolla, flattened with a long narrow appendage at the apex. Nutlets 4, erect, obovoid, rugose; base concave, surrounded by a thickened pseudostrophilar ring.

1. *B. officinalis* L.

Plate XXXVI

Fidloqqom
Borage

Hispid annual; stems 15-70 cm. high, erect, robust, often branched. Basal leaves 5-20 cm. long, ovate to lanceolate, petiolate; upper cauline sessile, amplexicaul. Cymes lax; pedicels 5-30 mm. long, stout, patent or deflexed after anthesis. Calyx 8-15 mm. long in flower, up to 20 mm. long in fruit; lobes linear-lanceolate, acute, connivent in fruit. Corolla rotate, clear blue, rarely white; tube very short or almost absent; lobes of limb 8-15 mm. long, lanceolate, acute. Nutlets 7-10 mm. long, oblong-obovoid. 2n = 16. Fl. 1-5.

Waste places, roadsides and fields. *Malta*, *Gozo* and *Comino*; very common everywhere (S. & C.G.; Borg; G. Lanfranco; Haslam; Wolseley).

Mediterranean region to C. Europe; widely cultivated and naturalised elsewhere.

9. *Myosotis* L.

Annual or perennial herbs. Flowers in usually paired cymes which are usually ebracteate or sometimes bracteate below. Calyx more or less accrescent in fruit, regularly 5-lobed, flat or slightly concave, usually blue (sometimes white, yellow or yellow and blue); scales 5, usually included, papillose, white or yellow. Stamens usually included, with a terminal ligulate appendage; filaments inserted about the middle of the tube. Style filiform, stigma capitate. Nutlets 4, ovoid, erect, more or less compressed, smooth and shiny, brown to black, often with a distinct rim; area of attachment usually small, sometimes with a spongy or ligulate appendage.

1. *M. ramosissima* Rochel.

Widniet il-gurdien

M. hispida Schlecht.; *M. collina* auct.

Early Forger-me not

Annual. Stems up to 40 cm. high. Rosette leaves up to 4 x 1 cm., lanceolate, obtuse; leaves with soft, patent straight hairs. Stem with soft, at base patent, above appressed, straight hairs. Inflorescence lax, ebracteate; pedicels in fruit scarcely longer than calyx, patent, more or less straight. Calyx up to 4 mm. long in fruit, divided to halfway, half-open, with many often deflexed hooked hairs at the base, deciduous. Limb of corolla up to 3 mm. in diameter, saucer-shaped, bright blue. Nutlets 1.2 x 0.7 mm., brown, without rim; attachment area usually filled with spongy tissue. Fl. 3-5.

Malta: collected by Delicata at St. Julian's in 1847, not recorded since.

Most of Europe; W. & C. Asia; Africa.

10. *Cynoglossum* L.

Biennial, perennial or rarely annual herbs. Flowers in usually ebracteate cymes. Calyx 5-lobed almost to the base, accrescent. Corolla with short, cylindrical to infundibuliform tube and rotate limb, with 5 scales closing the throat. Stamens

included, inserted at or above the middle of the tube. Style gynobasic, included; stigma small, subcapitate. Nutlets ovoid to subglobose, glochidiate, the external surface convex, flat or slightly concave, sometimes with a distinct border and disc.

1. *C. creticum* Miller

Plate XXXVII

Lsien il-Kelb

Southern Hound's-tongue

Biennial. Stems (20-) 30-60 cm. high, hirsute to tomentose. Cauline leaves oblong to lanceolate, shortly petiolate to amplexicaul, densely hairy on both surfaces. Cymes ebracteate. Calyx-lobes 6-8 mm. long, oblong, hirsute. Corolla 7-9 mm. long, deep blue, with distinct reticulate venation; tube broadly infundibuliform; limb about as long as tube, divided to about halfway, the lobes glabrous. Stamens inserted in lower part of tube. Nutlets 5-7 mm. in diameter, ovoid, without a distinct border; external face convex, densely and unequally glochidiate. Fl. 2-5.

Dry places in the valleys. *Malta*: locally frequent (G. Lanfranco), as at Wied Qirida, Wied Babu, Wied Incita, Gnejna, St. Paul's Bay (S. & C.G.; Borg); Wardija, San Martin, Buskett (Borg); Bahrija (Haslam); Wied il-Ghasel, Chadwick Lakes (Wolseley). *Gozo*: Mgarr, Ta' Cené, Xlendi (S. & C.G.).

Mediterranean region; Atlantic Islands.

LXXX. VERBENACEAE

Herbs or shrubs with opposite or verticillate leaves. Flowers hermaphrodite, 4-5-merous, weakly zygomorphic. Calyx usually small. Corolla with a rotate limb. Ovary superior, initially 1-locular but becoming 2- to 4-locular by the development of false septa; style terminal; ovules usually 1 in each loculus. Fruit usually a drupe, rarely a capsule or dividing into 2 or 4 1-seeded pyrenes.

1. Shrubs with digitate leaves

1. *Vitex*

Herb with remotely serrate or deeply incised 1- to 2-pinnatifid leaves

2. Calyx with 5 nearly equal teeth; fruit of 5 nutlets

2. *Verbena*

Calyx 2-lipped; fruit of 2 nutlets

3. *Lippia*

1. *Vitex* L.

Shrub with digitate leaves. Flowers in cymes forming a terminal panicle or spike-like inflorescence. Corolla 2-lipped, the upper lip with 2, the lower with 3 lobes. Stamens exserted. Fruit a small drupe.

1. *V. agnus-castus* L.

Plate XXXVII

Ghadiba

Sigret il-virgi

Virgin Bush

Shrub 1-2 m. high, fragrant. Young twigs with 4 obtuse angles, grey-puberulent. Leaves petiolate, with 5-7 stipitate leaflets; leaflets 1.5-10 cm. long, linear-lanceolate, acuminate, entire, whitish-tomentose beneath, glabrous above. Calyx and outside of corolla tomentose. Corolla 8-10 mm. long, blue or pink. Drupe globose, reddish black, little longer than the calyx. Fl. 5-9.

Valleys. *Malta*: rare (G. Lanfranco), as at Wied il-Baruni in Marsaskala (S. & C.G.; Borg); Wied Hażrun, Mtaħleb (Borg); Bahrija (Borg; Wolseley); Il-Mejda outside Rabat (Dennis Wolseley). *Gozo*: Ramla, Wied Bingenma, Dahlet Qorrot (S. & C.G.; Borg); San Blas, Buskett, Żebbug (Borg); Mgarr ix-Xini (Borg; Kramer & Westra; Wolseley); Pergla, Wied Hanaq (Wolseley), Dwejra (Gauci).

Mediterranean region, W. Asia to Iran.

2. *Verbena* L.

Annual or perennial herbs or small shrubs. Leaves opposite or rarely in whorls of 3. Flowers in bracteate spikes, usually arranged in panicles or corymbs. Calyx tubular, 5-ribbed and unequally 5-dentate. Corolla hypocrateriform, weakly bilabiate, with obtuse or emarginate lobes. Stamens inserted at about the middle of the corolla-tube, included. Stigma unequally 2-lobed. Fruit separating at maturity into 4 nutlets.

1. *V. officinalis* L.

Plate XXXVII

Buqexrem
Vervain

Perennial 30-60(-100) cm. high; stems longitudinally ribbed, scabrid on the angles and diffusely branched. Leaves more or less rhombic, strigulose, the lower 4-6 x 2-4 cm., petiolate, deeply incised, lyrate to 1- to 2-pinnatifid, the upper smaller, sessile and subentire or entire. Spikes terminal, long-pedunculate, solitary or in a very lax panicle; bracts ovate-acuminate, ciliate, at the most reaching half the length of the calyx. Nutlets 1.5-2 mm. in diameter, reddish-brown with 4 to 5 longitudinal ribs on the back. $2n = 14$. Fl. 4-12.

Waste places and road margins. *Malta* and *Gozo*: common (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Comino*: rare (Borg).

Europe, northwards to c. 54°N.; N. Africa; W. Asia to Himalaya; introduced elsewhere.

3. *Lippia* L.

Shrubs or herbs with simple leaves. Flowers in spikes. Corolla weakly 2-lipped. Stamens included. Fruit of 2, 1-seeded nutlets.

1. *C. nodiflora* (L.) Michx.

Perennial herb with procumbent, non-flowering stems rooting at the nodes, and ascending flowering stems 15-30 cm. long. Leaves 1-2.5 cm. long, obovate to oblanceolate, with a long-cuneate base, remotely serrate in the distal half. Flowers in short, stout, axillary spikes 5-7 mm. in diameter; peduncles much exceeding the subtending leaves. Calyx lobed almost to the base. Corolla 2 mm. in diameter, sparsely pubescent without, white; lobes subequal. Fl. 6-7.

Malta: Msida (I.M. Evans & Gauci).

Mediterranean region.

L. citriodora Kunth. (Wiza) a small tree, is frequently planted in gardens (Borg). A native of Chili.

LXXXI. CALLITRICHACEAE

Annual or perennial monoecious herbs with opposite leaves. Flowers axillary. Perianth absent. Stamen 1. Ovary 4-locular, with 1 anatropous, pendulous ovule in each loculus. Styles 2, filiform. Fruit separating into (2-) 4 mericarps. Seeds with fleshy endosperm.

1. *Callitriche* L.

Submerged amphibious or terrestrial herbs, with axillary glandular scales, and sometimes with peltate cauline hairs, otherwise glabrous. Leaves simple. Flowers solitary, or 1 male and 1 female flower in the same leaf-axil. Bracteoles 0 or 2

(in European species), membranous. Anthers reniform. Mericarps with rounded, keeled or winged margin.

3 of the 5 well defined European groups of species apparently occur in *Malta*. Hybridisation between species of different groups is unknown. The amphibious species are very variable, and identification is made difficult because of the vegetative similarity of different species when growing in similar habitats.

Ripe fruits are essential for identification; the anatomical details of the mericarps can easily be observed after stripping off the outer layer of cells. In species 2-4, peltate hairs are present on the stems; their shape and the number of cells in the disk are of diagnostic importance. All species except 1 can occur in the terrestrial form on mud; the habitat given is for the aquatic form. Terrestrial forms may be annual.

- | | |
|---|---------------------|
| 1. Terrestrial | 2. |
| Aquatic | 4. |
| 2. Mericarps winged only at apex; fruit obovate, rarely slightly elliptical | 3. <i>palustris</i> |
| Mericarps winged from base to apex; fruit suborbicular or slightly longer than wide | 3. |
| 3. Persistent styles erect or recurved, not appressed to sides of fruit | 2. <i>stagnalis</i> |
| Persistent styles deflexed and appressed to sides of fruit | 4. <i>brutia</i> |
| 4. All leaves submerged | 5. |
| Upper leaves spatulate, forming a floating or aerial rosette | 6. |
| 5. Leaves transparent; wing of mericarp, if present with at least 2 rows of cells; styles deciduous | 1. <i>truncata</i> |
| Leaves not transparent; wing of mericarp with 1 row of cells; persistent styles appressed to sides of fruit | 4. <i>brutia</i> |
| 6. Flowers submerged; pollen grains colourless; persistent styles appressed to sides of fruit | 4. <i>brutia</i> |
| Flowers aerial; pollen grains yellow; persistent styles not appressed to sides of fruit | 7. |
| 7. Mericarps winged from base to apex; fruit 1.4-1.75 mm. in diameter, suborbicular, brown | 2. <i>stagnalis</i> |
| Mericarps winged only at apex; fruit 1-(1.5) mm. in diameter, obovate or broadly elliptical, blackish | 3. <i>palustris</i> |

(a) Always submerged. Leaves more or less linear, transparent. Cauline hairs absent. Flowers solitary. Bracteoles absent. Stamens erect before and after dehiscence, scarcely elongating; anther-wall with thin-walled cells; pollen grains colourless without exine. Wing of mericarp, if present, composed at least in part of 2 or more rows of polygonal cells. Basic chromosome number $x = 3$.

- | | | |
|--|---------------|-------------------------|
| 1. <i>C. truncata</i> Guss. | Plate XXXVIII | Southern Water-starwort |
| <i>C. palustris</i> var. <i>autumnalis</i> auct. | | |

Leaves widest at base and tapering towards apex, or more or less elliptical, shallowly emarginate or truncate. Styles patent or deflexed, deciduous. Fruit 1-1.2

x 1.3-1.6 mm., wider than long, subsessile or stalked; mericarps not or only narrowly winged. Fl. 2-4.

Temporary pools on the coralline limestone. *Malta*: frequent at Wied Inčita (S. & C.G.; Borg), Wied il-Għasel, San Pawl tat-Targa (Borg; Wolseley), Nigret (Wolseley). *Gozo*: Dwejra (Borg), Munxar (Wolseley).

S. & W. Europe.

(b) Three forms: submerged and sterile; aquatic with floating rosette; and terrestrial. Submerged leaves not transparent. Disc of cauline hairs of 8-15 cells. Flowers solitary or 1 male and 1 female flower in the same leaf-axil. Bracteoles 2. Stamen recurved and elongating after dehiscence; anther-wall with thickened cells; pollen-grains yellow, with exine. Wing of mericarp, if present, composed of a single row of radially elongated cells. Basic chromosome number $x = 5$.

2. *C. stagnalis* Scop. Common Water-starwort
C. palustris var. *stagnalis* (Scop.) Fiori

Submerged leaves narrowly elliptical; floating rosettes with c. 6 broadly elliptical or suborbicular, pale green leaves. In terrestrial form, leaves small, broadly elliptical or suborbicular, pale green. Disc of cauline hairs orbicular, of 8-10(-12) cells. Flowers solitary, or 1 male and 1 female flower in the same leaf-axil. Pollen-grains subglobose. Fruit 1.75 x 1.6-1.5 mm., suborbicular, pale brownish, deeply grooved between the divergent mericarps; mericarps broadly winged, radial thickening of cells of wing often weakly developed. Styles in aquatic form erect or patent, in terrestrial form arcuate-recurved. $2n = 10$. Fl. 2-4.

Springs and still or slow moving water. *Malta*: (Gulia; Borg).

Most of Europe; N. Africa; Atlantic Islands.

3. *C. palustris* L.
C. palustris var. *verna* (L.) Borg

Submerged leaves very narrowly linear; floating rosettes with elliptical or suborbicular leaves; in terrestrial form, leaves small, elliptical. Disc of cauline hairs orbicular, of 12-15 cells. Usually 1 male and 1 female flower in the same leaf-axil; pollen-grains subglobose; styles erect, caducous. Fruit 1(-1.5) mm. in diameter, obovate, rarely elliptical, blackish; mericarps winged only at apex, the cells of the wing thickened on radial walls, not tapering. $2n = 20$. Fl. 2-4.

Still, shallow water. *Gozo*: (Gulia; Borg).

Much of Europe.

(c) Three fruiting forms: submerged; aquatic with floating rosettes; and terrestrial. Submerged leaves not transparent. Disc of cauline hairs of (8-)12-20 cells. Flowers solitary. Bracteoles 2, deciduous or absent. Stamen recurved towards one of the deflexed styles; anther-wall with thin-walled cells; pollen-grains colourless, without exine. Wing of mericarp composed of a single row of short cells with thickening on the radial and proximal walls. Basic chromosome number $x = 7$.

4. *C. brutia* Petagna
C. palustris var. *pedunculata* (DC.) Fiori

Usually slender. Submerged leaves linear, not widened at apex, often irregularly emarginate; floating rosettes with elliptical, dark green leaves. Disc of cauline

hairs elliptical, often somewhat irregular in outline, of 8-16 cells. Pollen-grains subglobose. Styles deflexed, appressed to sides of fruit. Fruit 1-1.4 x 1-1.2 mm., suborbicular or slightly longer than wide, subsessile in aquatic form, with stalk up to 13 mm. long in terrestrial form. Mericarp mostly broadly winged.

Still, often shallow water. *Gozo*: Ta' Cené, very rare (Gulia; Borg).

W. & S. Europe.

LXXXII. LABIATAE

Herbs or shrubs, often glandular and aromatic. Leaves usually simple, exstipulate, opposite. Flowers zygomorphic, usually in contracted and modified cymes in the axils of opposite bracts or floral leaves, forming pseudowhorls called verticillasters which in turn are arranged in simple or compound spike-like, cymose, corymbose, paniculate or capitate inflorescences; rarely in true cymes. Bracts leaf-like, or much reduced or modified (usually called floral leaves when conspicuous). Bracteoles usually small, sometimes absent. Calyx usually 4- or 5-lobed, often 2-lipped with the upper lip 3-toothed and the lower 2-toothed. Corolla sympetalous; limb usually 5-lobed, often 2-lipped with the upper lip 2-lobed and the lower lip 3-lobed, rarely the 5 lobes forming the lower lip. Stamens usually 4, didynamous, rarely 2. Ovary superior, 2-carpellate but appearing equally 4-lobed when mature due to further partition; style single, usually branched above and gynobasic. Fruit of four 1-seeded nutlets.

Sexual dimorphism occurs in several genera, with female flowers, which are normally smaller, occurring in addition to the usual hermaphrodite flowers, on the same or on different plants.

The calyx may be entire or shallowly to deeply lobed or toothed, and in the key, the calyx-tube is regarded as extending from the base of the calyx up to the lowermost sinus. The number of veins refers to the lower part of the tube.

- | | |
|--|-----------------------|
| 1. Corolla more or less 1-lipped, the upper lip much reduced or absent. | 2. |
| Corolla with 5 lobes or distinctly 2-lipped | 3. |
| 2. Upper lip of corolla present, entire or consisting of 2 small teeth; corolla tube with a ring of hairs inside | 1. <i>Ajuga</i> |
| Upper lip of corolla absent, corolla tube glabrous inside | 2. <i>Teucrium</i> |
| 3. Fertile stamens 2 | 4. |
| Fertile stamens 4 | 5. |
| 4. Upper lip of corolla concave and bifid; stamens with 2 fertile cells | 16. <i>Rosmarinus</i> |
| Upper lip of corolla distinctly hooded (concave); stamens with 1 fertile cell | 17. <i>Salvia</i> |
| 5. Calyx actinomorphic with more or less equal teeth | 6. |
| Calyx zygomorphic with teeth differing in length and shape | 14. |
| 6. Corolla 2-lipped | 7. |
| Corolla with 5(-4) subequal lobes | 13. |

- | | |
|---|---|
| 7. Upper lip entire and distinctly hooded
Upper lip bifid, or very short; flat or concave | 8. 11. |
| 8. Stamens longer than corolla; filaments diverging
Stamens longer than corolla; filaments converging
or parallel | 13. <i>Origanum</i> |
| 9. Annual herb up to 30 cm. high
Perennial herbs or shrubs up to 130 cm. high | 7. <i>Lamium</i> |
| 10. Corolla 23-35 mm. long, yellow
Corolla 10-14 mm. long, lilac or white | 6. <i>Phlomis</i>
8. <i>Ballota</i> |
| 11. Calyx with 10 teeth
Calyx with 5 teeth | 4. <i>Marrubium</i> |
| 12. Upper lip of corolla less than 6 mm. long, entire
Upper lip of corolla more than 6 mm. long, bifid | 1. <i>Ajuga</i>
9. <i>Stachys</i> |
| 13. Stamens 4, included
Stamens 4, exerted except in some hybrids and
female flowers | 12. <i>Micromeria</i> |
| 14. Stamens diverging and exerted
Stamens parallel and included | 15. <i>Mentha</i>
14. <i>Thymus</i> |
| 15. Inflorescence of pedunculate cymes
Inflorescence of verticillasters | 11. <i>Calamintha</i> |
| 16. Verticillasters 1-(2) flowered
Verticillasters 4-12 flowered | 3. <i>Prasium</i> |
| 17. Leaves 10-25 x 15-12 mm.; calyx 10-veined
Leaves 20-80 x 15-50 mm.; calyx 13-veined | 5. <i>Sideritis</i>
10. <i>Melissa</i> |

1. *Ajuga* L.

Annual or perennial herbs. Calyx more or less actinomorphic with 10 or more veins. Upper lip of the corolla usually very short; lower lip 3-lobed; corolla-tube with a ring of hairs on the inside. Stamens 4, the outer 2 longer than the inner 2, all usually exerted. Nutlets reticulate-veined or transversely rugose.

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| 1. Leaves 3 partite with linear sometimes 3-fid lobes
Leaves entire, toothed or shallowly lobed | 3. <i>chamaepitys</i> | 2. |
| 2. Leaves 10-40 mm. wide, ovate
Leaves 3-6(-8) mm. wide, linear | 1. <i>reptans</i>
2. <i>iva</i> | |

1. *A. reptans* L. Bugle

Rhizomatous perennial with long stolons; stems 10-40 cm. high, pubescent on opposite faces, alternating at each node, sometimes glabrous at the base. Lower leaves 25-90 x 10-40 mm., ovate, entire or crenate. Bracts ovate, often tinged with blue, the upper shorter than the flowers. Whorls crowded, usually 6-flowered. Calyx 4-6 mm. long, the teeth as long as or slightly shorter than the tube. Corolla 14-17 mm. long, blue, rarely pink or white, tube exceeding calyx; upper lip entire. Stamens exerted, filaments hairy. Fl. 1-4.

Valeriana *Malta*: rare as at Wied Balluta (GD.; Borg); San Anton (Borg). *Gozo*: Xlendi (Gulia).

Most of Europe northwards to c. 62° N.; S.W. Asia; N. Africa.

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| 2. <i>A. iva</i> (L.) Schreber
incl. var <i>pseudo-iva</i> Rob. et Cast | Xantkura
Southern Bugle |
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Caespitose perennial; stems 5-20 cm. high, woody at base, usually much-branched, villous or lanate-villous. Leaves 14-35 x 3-6(-8) mm., linear or linear-oblong, entire or with 2-6 short lobes. Bracts similar to the leaves, exceeding the flowers. Flowers 2-4 at each node. Calyx 3.5-4.5 mm. long, the teeth as long as or shorter than the tube. Corolla 12-20 mm. long, purple, pink or yellow; tube exceeding calyx; upper lip entire. Stamens exerted; filaments hairy. Fl. 1-6.

Rocky wastes and roadsides. *Malta*, *Gozo* and *Comino*: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region.

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| 3. <i>A. chamaepitys</i> (L.) Schreber | Ground-pine |
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Annual or short-lived perennial; stem 5-30 cm. high, usually much-branched, glabrous to densely lanate-villous. Leaves 3-partite with linear segments 0.5-3(-4) mm. wide, the segments sometimes 3-fid. Bracts similar to the leaves. Flowers 2-4 at each node. Calyx 4-6 mm. long, the teeth as long as or shorter than the tube. Corolla yellow with red or purple markings, rarely entirely purple; tube about equalling calyx; upper lip entire. Stamens exerted; filaments hairy. Fl. 3-4.

Malta: Wied Ballut and Wied Babu according to Delicata and Gulia (GD; Borg).

Europe except the north and most of the islands; W. Asia; N. Africa.

2. *Teucrium* L.

Herbs or shrubs. Calyx tubular or campanulate, bilabiate or regular, 5-toothed, the teeth equal or the upper largest. Corolla with one 5-lobed lip; tube usually included in the calyx, without a ring of hairs within. Nutlets smooth or reticulate.

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| 1. Branches ending in spines which are leafless or with
very small leaves
Not spinose | 3. <i>spinosum</i> | 2. |
| 2. Leaves entire
Leaves crenate, serrate or lobed | 1. <i>fruticans</i> | 3. |
| 3. Herbs, not woody at base
Dwarf shrubs | 2. <i>scordium</i> | 4. |
| 4. Rhizomatous; stems woody at base only
Not rhizomatous; stems woody except or ultimate
branches | 4. <i>chamaedrys</i>
5. <i>flavum</i> | |

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| 1. <i>T. fruticans</i> L. | Plate XXXVIII | Zebbugija
Evergreen Germander |
|---------------------------|---------------|----------------------------------|

Evergreen shrub up to 250 cm. high. Twigs 4-angled, white-tomentose. Leaves lanceolate to ovate, entire, flat, shortly petiolate, white- or reddish-tomentose beneath, glabrous and shining above. Verticillasters 2-flowered; bracts leaf-like.

Calyx shortly campanulate, white-tomentose outside, glabrous within. Corolla 15-25 mm. long, blue or lilac; stamens long-exserted. Fl. 1-6.

Rocky places and old walls. *Malta*, *Gozo* and *Comino*: very common (S. & C.G.; Borg; G. Lanfranco; Wolseley; Haslam). *Cominotto*: (Duthie).

Mediterranean region.

2. *T. scordium* L. subsp. *scordicoides* (Schreber) Maire & Petitmengin
Water Germander

Softly hairy to subglabrous, stoloniferous perennial, smelling of garlic when crushed. Stolons usually densely covered with scale-leaves. Stems 10-60 cm. high, often freely branched. Leaves ovate to oblong, coarsely dentate, or crenate-dentate, sessile or subsessile. Leaves of the main stem cordate and semiamplexicaul, leaves of lateral branches rounded at base. Flowers in axils of leaf-like bracts which are usually longer than the flowers. Calyx villous, obscurely veined; teeth c. $\frac{1}{2}$ as long as tube, triangular, acuminate. Corolla 7-10 mm. long, villous, purplish; tube slightly exceeding calyx. $2n = 32$. Fl. 4-8.

Winter-wet places in valleys. *Malta*: rare (G. Lanfranco), as at Mtahleb, Fiddien. Wied il-Klejgha (S. & C.G.; Borg); Gerżuma (Brenner; Borg); Bahrija, Wied Hażrum (Borg). *Gozo*: rare, Wied il-Lunzjata (Gulia; Borg).

Europe, north to Ireland, Denmark and Estonia; W. Asia; N. Africa. Subsp. *scordicoides* is confined to the southern part of the range.

3. *T. spinosum* L.
Spiny Germander

Pubescent or villous, glandular annual. Stems 30-50 cm. high, much-branched, the branches spinose and more or less leafless at flowering time. Lower leaves oblong, narrowed at base, incise-serrate above; upper leaves small, entire. Flowers solitary or 4-6 together in the axils of the distant upper leaves. Calyx 6-7 mm. long, weakly veined; upper tooth broadly ovate, the others 2-2.5 mm. long, narrowly triangular to subulate, all spinescent. Corolla 6-8 mm. long, white, resupinate; tube included in the calyx. Fl. 5-7.

On the Coralline plateaus. *Malta*: very rare, Tal-Gholja (G.D.; Borg). *Gozo*: Ta' Cené, Ta' Harraz according to Gulia (Gulia; Borg).

W. Mediterranean region.

4. *T. chamaedrys* L.
Wall Germander

Shortly villous, rhizomatous, dwarf shrub with annual flowering stem 5-50 cm. high. Leaves up to 2 x 1 cm. linear, oblong or oblong-obovate, entire to incise-serrate with obtuse teeth, or crenate-dentate, pubescent or velutinous beneath. Inflorescence lax to subcapitate. Calyx 5-8 mm. long, villous and glandular; teeth c. $\frac{1}{2}$ as long as tube, triangular-acuminate. Corolla 9-16 mm. long, pale to deep purple, rarely white, hairy. Fl. 4-7.

Malta: rare, Balluta (G.D.; Borg). *Gozo*: rare, Xlendi according to Gulia (Gulia; Borg).

Mediterranean region, northwards to the Netherlands, S. Poland and S.C. Russia.

5. *T. flavum* L.

Borghom
Yellow Germander

Small, stout hairy shrub with annual flowering stems up to 50 cm. high. Leaves up to 3 x 2 cm., ovate, crenate-serrate, sometimes sparsely and shallowly so. Inflorescence dense to lax. Calyx (6-) 8-9 mm. long, hirsute or shortly villous and glandular; teeth c. $\frac{1}{2}$ as long as to nearly as long as tube, triangular with a prominent midrib. Corolla 14-18 mm. long, yellowish or purple, villous. Fl. 4-7.

Rocky ground. *Malta* and *Gozo*: very frequent (S. & C.D.; Borg; G. Lanfranco; Haslam; Wolseley). *Comino*: frequent (Borg; Wolseley; Gauci).

Mediterranean region.

3. *Prasium* L.

Shrub. Verticillasters reduced to a single flower (rarely 2) in the axils of floral leaves, forming terminal racemes. Calyx campanulate, 2-lipped, 10-veined; upper lip 3-lobed, the lower deeply 2-fid; all the lobes leaf-like. Corolla 2-lipped; tube with a ring of scale-like hairs inside; upper lip entire, the lower 3-lobed. Stamens didynamous, parallel; anther cells divergent. Style 2-fid, the branches subequal, subulate. Nutlets drupe-like.

1. *T. majus* L. Plate XXXVIII Tà squali
Mediterranean Prasium

Stems up to 1 m. high, erect, divaricately branched, glabrous or glabrescent, rarely hirsute. Leaves 20-40 x 8-20 mm., ovate to ovate-lanceolate, acute and mucronate, crenate or crenate-serrate, the lower cordate and the upper truncate at the base, usually glabrous; petiole 10-18 mm. long. Floral leaves like the cauline but smaller, or the upper entire. Calyx accrescent, up to 2.5 cm. long in fruit, puberulent-glandular or glabrous; lobes ovate to ovate-lanceolate, aristate. Corolla 17-20 mm. long white or lilac; upper lip oblong, obtuse; lower lip with the middle lobe largest. Nutlets 3-4 mm. long, ovoid, trigonous, black. $2n = 34$. Fl. 1-6.

Rocky places, but not arid. *Malta* and *Gozo*: common (Borg; G. Lanfranco; Wolseley). *Comino*: valley behind Sta Marija (Wolseley).

Mediterranean region.

4. *Marrubium* L.

Perennial herbs. Stems erect, simple or branched. Leaves simple. Flowers in verticillasters. Bracts usually present, ascending from a deflexed base. Calyx narrowly obconical, usually 10-ribbed or striate, with 5-10 teeth; tube densely hairy inside at the mouth. Corolla bilabiate, the upper lip straight, bifid, the lower lip 3-lobed; tube included, with an uneven ring of hairs or glabrous within. Stamens 4, parallel, the outer pair longer, all included in the corolla-tube; anther cells diverging. Nutlets ovoid-triquetrous, truncate at apex.

1. *M. vulgare* L. Plate XXXVIII Marrubija bajda
White Horehound

Stems up to 45 cm. high, with many short non-flowering branches, white-lanate at least below. Leaves orbicular to broadly ovate, subcordate or rounded at base, deeply and irregularly crenate, sparsely tomentose to subglabrous above, more densely tomentose beneath; petioles of lower leaves shorter than the lamina. Verticillasters globose, many-flowered, distant. Bracts subulate, villous-plumose.

Calyx-tube 3-4 mm. long, obscurely 10-striate, villous-pubescent; teeth 10, shorter than corolla, equal, patent, hamate, villous beneath, glabrous above. Corolla exceeding calyx-teeth, white. $2n = 34$. Fl. 4-6.

Waste places. *Malta*: infrequent (G. Lanfranco) as at Mdina, Baħrija (S. & C.G.; Borg); Gharghur, Selmun (GD; Borg); Wied il-Lunzjata, Wardija (Gulia; Borg); Liklin, Tarxien, Attard (Borg); Addolorata Cemetery (Borg; Wolseley). *Gozo*: Rabat, Gran Castello (Borg).

Mediterranean region northwards to England, S. Sweden and C. Russia; W. Asia; Atlantic Islands.

5. *Sideritis* L.

Annual, or perennial herbs with woody base, or small shrubs. Verticillasters 2- to many-flowered; bracts leaf-like or not; bracteoles absent. Calyx campanulate, 10 veined, 5-toothed, the teeth equal or the upper larger than the 4 lower. Corolla usually yellow; tube not exceeding calyx; upper lip patent, more or less flat, entire to bifid; lower lip 3-lobed. Stamens included in corolla-tube. Nutlets rounded at apex.

1. *S. renana* L. Plate XXXVIII Common *Sideritis*

Villous-lanate annual up to 30 cm. high. Stems eglandular. Leaves 10-25 x 5-12 mm., oblong-ovate, dentate or crenate-dentate. Verticillasters c. 6-flowered, distant. Calyx 6-10 mm. long, 2-lipped; upper tooth broadly ovate, lower lanceolate, all aristate. Corolla 7-10 mm. long, yellow, white or purple, equalling or slightly exceeding calyx. Fl. 3-6.

Arid, rocky, waste ground. *Malta*, *Gozo* and *Comino*: very frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region.

6. *Phlomis* L.

Herbs or shrubs. Leaves petiolate. Flowers in few- to many-flowered verticillasters in the axils of reduced upper leaves. Bracts narrow, differing markedly from the leaves. Calyx tubular, 5- to 10-veined, 5-toothed. Corolla bilabiate, the upper lip erect or arcuate, emarginate, the lower lip patent, 3-lobed. Stamens 4, included or exerted; anther cells diverging. Style bifid. Nutlets trigonous, glabrous or pubescent.

1. *P. fruticosa* L. Plate XXXVIII Salvjun, Salvja tal-Madonna
Woody *Phlomis*

Shrub up to 130 cm. high. Basal leaves 3-9 cm. long, elliptical, lanceolate or lanceolate-ovate, truncate or cuneate at base, entire or crenulate; coriaceous, shortly tomentose above, white-tomentose beneath; petioles up to 4 cm. long. Floral leaves predominantly lanceolate, obtuse at apex. Verticillasters (5-)15- to 35-flowered. Bracts 10-12 x (2-)3-7 mm., obovate, ovate-lanceolate, oblanceolate or elliptical, acuminate, tomentose and ciliate with hairs 2-3 mm. long. Calyx 10-19 mm. long, tomentose not ciliate; calyx-teeth 1-3.5(-4) mm. long, subulate. Corolla 23-35 mm. long. $2n = 20$. Fl. 3-6.

Rocky plateaus and sides of valleys. *Malta*: locally common (G. Lanfranco), as at Wied Inġita, Wied il-Għasel, Mellicha (S. & C.G.; Borg; Wolseley); Misraħ Ghonoq, Majesa, Aħrax, Buskett, Dingli (Borg; Wolseley); Hoffriet ir-Rizz, Wied Anġlu

(Wolseley); Eingemma (Murray; Wolseley); Wied Ħesri, Victoria Lines (Gauci).
S. Europe.

7. *Lamium* L.

Annual or perennial herbs. Flowers in dense whorls in the axils of leaf-like bracts. Calyx tubular or campanulate, 5-veined, with 5 equal or subequal teeth. Corolla white, pink or purple, 2-lipped; upper lip forming a hood; lower lip obcordate or broadly obovate with small or minute lateral lobes, rarely without lateral lobes. Anther cells divaricate. Nutlets trigonous, truncate at apex.

1. *L. amplexicaule* L. subsp. *amplexicaule* Plate XXXVIII Henbit Dead-nettle

Sparsely to densely pubescent annual up to 30(-40) cm. high. Leaves 7-25 x 7-25 mm., orbicular or ovate-orbicular, crenate or lobed, with obtuse lobes. Bracts up to 30 x 40 mm. long, usually wider than long, shallowly lobed, sessile or subsessile, somewhat amplexicaul. Calyx 5-7 mm. long, the teeth shorter or longer than the tube. Corolla 14-20(-25) mm. long, pinkish-purple; tube 10-14 mm. long, distinctly exceeding calyx; upper lip 3-5 mm. long, entire; lateral lobes minute or absent; lower lip 1.5-2.5 mm. long, obcordate. Anthers hairy. $2n = 18$. Fl. 12-4.

In fields and gardens amongst growing crops, and in waste places. *Malta*: common (S. & C.G.; Borg; G. Lanfranco); locally abundant as in the Dingli area (Wolseley). *Gozo* and *Comino*: less common (Borg); Wied Qorrot (S. & C.G.). Europe to c. 69° 50' N.; W. Asia; N. Africa; Atlantic Islands.

8. *Balota* L.

Small shrubs or perennial herbs. Stems erect or ascending, branched from the base. Leaves simple. Flowers purple or lilac, the upper lip white, rarely all white, in axillary whorls. Calyx 10-veined, limb undulate, or with 5-16-crenations or teeth, the lobes more or less mucronate or gradually narrowed into an awn, rarely entire. Corolla-tube included or subincluded, with a ring of hairs inside. Stamens parallel, the outer pair the longer; anther cells diverging. Nutlets oblong, rounded at apex.

1. *B. nigra* L. subsp. *uncinata* (Flori & Béguinot) Patzak Marrubja sewda
Plate XXXVIII Black Horebound

Perennial up to 130 cm. high. Stems pubescent to subglabrous. Lower cauline leaves 3-8 x 2-6 cm., cordate to cuneate at base, ovate or ovate-oblong; petiole usually short, rarely up to 80 mm. long. Bracteoles 7-9 mm. long, subulate or filiform, membranous. Whorls many-flowered. Calyx 7-13 mm. long; limb regularly dentate; lobes 5, awned or mucronate. Corolla 10-14 mm. long, lilac or white. $2n = 22$. Fl. 4-11.

Rocky waste places. *Malta*: rare (G. Lanfranco), as at Dingli, Ghemieri (S. & C.G.; Borg); Burnahhala, Pwales, St. Paul's Bay (Borg); Selmun (GD; Borg); Sa Maison (Camilleri); Addolorata Cemetery valley (Borg; Wolseley). *Gozo*: Munxar, Capuchin convent (S. & C.G.; Borg); Xlendi (Haslam; Wolseley); Xewkija (Wolseley).

Most of Europe, Mediterranean region. Subsp. *uncinata* is confined to the southern part of the range.

9. *Stachys* L.

Annual or perennial herbs or small shrubs. Verticillasters 2- to many-flowered (rarely reduced to a solitary flower), in dense or lax spike-like, rarely capitaliform.

inflorescences. Calyx tubular or campanulate with 5 equal teeth, rarely slightly 2-lipped, 5- to 10-veined. Corolla 2-lipped; upper lip flat or hooded; lower lip 3-lobed. Nutlets obovoid or oblong, rounded at apex.

1. *S. ocyuistrum* (L.) Briquet Plate XXXVIII Hairy Woundwort
S. hirta L.

Erect hirsute annual 20-50 cm. high. Leaves 10-50 x 7-40 mm., oblong-ovate to broadly ovate, obtuse, slightly cordate at base, crenate-serrate, hirsute. Whorls 4- to 6-flowered, remote or the upper crowded. Calyx 7-10 mm. long, hirsute, the teeth equal, as long as or longer than the tube. Corolla 12-15 mm. long, white; the tube shorter than calyx; upper lip c. 6 mm. long, bifid; lower lip c. 7 mm. long. Fl. 3-5.

Valleys, *Malta*: (G. Lanfranco), as at Mtableb, Gnejna, Buskett, Kordin. Wied il-Ghasel (S. & C.G.; Borg); Wied Inčica (S. & C.G.; Borg; Wolseley). Gozo: rare. Pergla (Gulia; Borg); Nadur (Borg); Mgarr ix-Xini (Evans); Dabiet Qorrot (Gauci).

S.W. Europe, Italy; once recorded from Kriti; Atlantic Islands.

10. *Melissa* L.

Perennial herbs. Verticillasters few- to many-flowered, in the axils of reduced upper leaves. Bracts narrow. Calyx campanulate, 2-lipped, 13-veined; upper lip flattened, 3-toothed; lower lip 2-toothed. Corolla 2-lipped, the tube curved and dilated above the middle, without a ring of hairs inside; upper lip erect, sometimes slightly hooded, emarginate; lower lip 3-lobed. Stamens didynamous, included, convergent; anther cells divergent. Style branches subequal, subulate. Nutlets oblong-obovoid, obtuse, smooth.

1. *M. officinalis* L. Plate XXXIX *Melissa*, Nagniegh in-nahal, Burieha Balm

Rhizome short. Stem 20-150 cm. high, erect, branched, shortly glandular-puberulent, and with sparse or dense, long, patent eglandular hairs or glabrescent. Leaves 2.9 x 1.5-7 cm., broadly ovate to rhombic or oblong, obtuse or acute, more or less deeply crenate except at the base; petioles up to 4 cm. long. Floral leaves crenate serrate. Verticillasters 4- to 12-flowered; peduncles short or absent. Pedicels 1-3 mm. long. Bracteoles 2-5 mm. long, ovate to linear, entire, acuminate. Calyx 7-9 mm. long, with long, patent, eglandular and short glandular hairs; teeth of lower lip lanceolate-triangular. Corolla 8-15 mm. long, pale yellow, fading to white or pinkish. Nutlets 1.5-2 mm. in diameter, brown, $2n = 32, 64$. Fl. 5-7.

The plants of the Maltese Islands are probably all referable to subsp. *altissima* (Sm.) Arcangeli.

Valleys and shady places, also cultivated. *Malta*: rare. San Martin, Pwales (S. & C.G.; Borg); Buskett (Borg). Gozo: rare, Xlendi (S. & C.G.; Borg); Pergla (Gulia; Borg).

Throughout Europe except for parts of the north; W. Asia; N. Africa.

Subsp. *altissima* in confined the southern part of this area.

11. *Calamintha* Miller

Perennial herbs, sometimes woody at base. Flowers in opposite, axillary, usually pedunculate cymes; bracts similar to the leaves. Calyx tubular, 13-veined, more or less 2-lipped, the upper lip 3-toothed, the lower lip 2-toothed and longer than the

upper; tube straight, not gibbous, hairy in the mouth. Corolla 2-lipped; upper lip entire or emarginate; lower lip 3-lobed, the middle lobe the largest; tube straight. Stamens included, curved, convergent. Style branches unequal, the upper subulate, the lower longer and wider.

1. *C. nepeta* (L.) Savi Plate XXXIX *Kammilla*
Satureja nepeta (L.) Scheele Lesser Calamint

Sparsely to densely pubescent perennial 30-60 cm. high. Leaves 10-20 (-25) x 8-12 mm., broadly ovate, obtuse, subentire or shallowly crenate serrate with up to 5 teeth on each side. Cymes 5- to 11(-15)-flowered; peduncle 0.5 (-10) mm. long, the secondary branches 0.5 mm. long. Calyx 3-6 x 1.5(-2) mm., sparsely to densely puberulent or pubescent, the hairs in the mouth exerted; upper teeth 0.5-1 mm. long, broadly triangular; lower teeth 1-2 mm. long, puberulent, rarely with a few long cilia. Corolla 10-15 mm. long, white or lilac. $2n = 20, 24$. Fl. 5-11.

All the plants from the Maltese Islands are probably referable to subsp. *glandulosa* (Req.) P.W. Ball.

Roadsides and other waste places. *Malta* and Gozo: frequent (S. & C.G.; Borg; G. Lanfranco; Haslam, Wolseley).

Mediterranean region extending northwards to c. 54° 30' N.

12. *Micromeria* Benth

Perennial herbs or dwarf shrubs. Flowers in verticillasters or in lax cymes; bracts similar to the leaves. Calyx tubular 13(-15)-veined, sometimes actinomorphic and straight, sometimes zygomorphic and somewhat curved, scarcely gibbous and somewhat 2-lipped with rather unequal teeth, hairy or glabrous in the mouth. Corolla 2-lipped, with straight tube. Stamens shorter than corolla, curved, convergent. Style-branches unequal, subulate.

Verticillasters with 1-6 flowers
Verticillasters with 6-18 flowers

1. *microphylla*
2. *graeca*

1. *M. microphylla* (D'Urv.) Benth Plate XXXVIII *Sghatrija*
Spakkapjetra
Small-leaved *Micromeria*

Subglabrous to somewhat pubescent dwarf shrub 10-30 cm. high, with more or less filiform, procumbent or ascending, often branched stems. Leaves 3-6 x 2-4 mm., triangular-ovate to elliptical, the upper sometimes narrowly elliptical, rounded or cuneate at base, acute, entire, flat, sessile. Verticillasters with 1-6 usually erecto-patent flowers; peduncles or pedicels c. $\frac{1}{2}$ as long as subtending leaves. Calyx 2.5-3.5 mm. long, patent-pubescent, villous in throat; teeth c. $\frac{1}{2}$ as long as tube, lanceolate-acuminate to subulate, unequal. Corolla 5-8 mm. long, purple. Fl. 1-7.

Rocky areas. *Malta*, Gozo and *Comino*: very common (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Cominotto*: (Duthie).

S. Italy, Sicilia; Kriti and Karpathos.

2. *M. graeca* (L.) Benth *Pink Micromeria*

Sparsely pubescent to hirsute or hispid dwarf shrub 10-50 cm. high, with many erect or ascending, usually simple stems. Leaves 5-12 x 2-7 mm., the lower

ovate, acute, the upper lanceolate or linear-lanceolate, with revolute margins. Verticillasters shortly pedunculate with (2-)6-18, more or less erecto-patent, shortly pedicellate flowers, usually about equalling the subtending leaves; bracts mostly not more than $\frac{1}{2}$ as long as calyx. Calyx (2-)3.5 mm. long, villous in throat; teeth $\frac{1}{2}$ - $\frac{3}{4}$ as long as tube, lanceolate-subulate, unequal. Corolla 6-8(-13) mm. long, purplish. Nutlets obtuse or shortly apiculate. Fl. 3-7.

Rocky ground. *Malta*: Wied Balluta. Ghajn il-Kbira (GD.; Borg).

Mediterranean region.

13. *Origanum* L.

Small shrubs or annual, biennial or perennial herbs. Verticillasters with few to many-flowers, aggregated into short terminal or lateral spicules; spicules arranged in paniculate, cymose or corymbiform inflorescences. Bracts distinct from leaves, imbricate, often conspicuous, coloured. Calyx campanulate or turbinate, 2-lipped and either with 5 equal teeth, or entire, obliquely truncate at apex or 1-lipped and deeply slit on one side. Corolla 2-lipped, the upper lip entire or emarginate; lower lip 3-lobed. Stamens didynamous, exerted or included; anther cells divergent. Style-branches equal.

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|--|---------------------|----|
| 1. Calyx 2-lipped
Calyx with 5 nearly equal teeth or 1-lipped and with a deep split on one side | 3. <i>dictamnus</i> | 2. |
| 2. Calyx with 5 nearly equal teeth
Calyx 1-lipped, with a deep split on one side | 1. <i>vulgare</i> | |
| | 2. <i>onites</i> | |
| 1. <i>O. vulgare</i> L. | Riegnu
Marjoram | |

Woody rhizomatous perennial; stems up to 90 cm. high or more, branched above, pubescent, hirsute or velutinous (rarely glabrous). Leaves 10-40 (-50) x 4-25 mm., ovate, entire or shallowly crenate-serrate, glabrous or hairy, glandular punctate, petiolate. Spicules 5-30 mm. long, ovoid, oblong or prismatic, forming a corymb or panicle. Bracts 4-5 mm. long, ovate, hairy or glabrous, eglandular or sparsely glandular, usually violet-purple, varying to greenish. Calyx hairy or glabrous. Corolla 4-7 mm. in diameter, white or purplish-red. $2n = 30$, ?32. Fl. 5-8.

Malta: cultivated as a pot-herb, naturalised in gardens and around farm-houses as at Siggiewi and Qormi (Borg).

Throughout most of Europe; N. & W. Asia.

- | | |
|------------------------|----------------|
| 2. <i>O. onites</i> L. | White Marjoram |
|------------------------|----------------|

Small shrub with stems up to 60 m. high, erect, densely papillose and hirsute. Leaves 5-22 x 4-12(-17) mm., ovate or orbicular-ovate, rounded or cordate at the base, acute or shortly acuminate at the apex, entire or remotely serrate, papillose and villous, glandular-punctate, with the nerves somewhat raised on lower surface; lower leaves petiolate, the others sessile. Spicules 4-10 mm. long, ovoid, oblong or prismatic, very compact, forming a terminal, dense, corymb 2-8(-10) cm. in diameter. Bracts 3-3.5 mm., somewhat longer than the calyx, the lower ovate, acute, the upper orbicular-ovate, obtuse, puberulent. Calyx 2.75-3 mm. long, 1-lipped, ovate-spathulate, split anteriorly, entire or minutely 3-dentate, sub-

glabrous, glandular-punctate, ciliate. Corolla 4-5.5 mm. long, white. Nutlets c. 1 mm. long, oblong-ellipsoid. $2n = 30$. Fl. 5-8.

Malta: Marsa on disturbed ground (Wolseley).

Mediterranean region.

3. *O. dictamnus* L.

Dittany

White-lanate dwarf shrub up to 20 cm. high. Leaves 13-25 x 12-25 mm., broadly ovate to orbicular, entire, lanate, the veins raised, conspicuous; lower leaves shortly petiolate. Spicules in group of 3-16, dense, ovoid or oblong, arranged in opposite pedunculate pairs, in lax panicles. Bracts 7-10 mm. long, purple, longer than the calyx. Upper lip of calyx subentire, the lower shallowly toothed. Corolla pink, the tube twice as long as the calyx. Fl. 5-8.

Rocky places. *Malta*: very rare at Għnien il-Kbir where it was probably a casual (S. & C.G.; Borg).

Kriti.

14. *Thymus* L.

Small shrubs or perennial herbs, woody at least at base. Verticillasters 1-10 many-flowered, often crowded into a terminal capitate inflorescence. Bracts leaf-like or not. Calyx cylindrical to campanulate, usually 2-lipped with the 3 upper teeth different from the lower; tube straight, not gibbous, hairy in the throat. Corolla 2-lipped with straight tube. Stamens usually exerted, straight, divergent. Nutlets ovoid, smooth.

- | | | |
|---|-------------|---------------------|
| 1. <i>T. capitatus</i> (L.) Hoffmanns. & Link | Plate XXXIX | Saghtar |
| | | Mediterranean Thyme |

Dwarf shrub 20-50 (-150) cm. high, with ascending to erect woody branches bearing axillary leaf-clusters (often the only leaves during the dry season). Leaves of long shoots 6-10 x 1-1.2 mm., sessile, linear, acute, subglabrous, sparsely ciliate at base; lateral veins not visible. Inflorescence oblong-conical; bracts c. 6 x 2 mm., imbricate, ovate to lanceolate, greenish, ciliate; bracteoles c. 6 mm. long, similar to the leaves. Calyx c. 5 mm. long, the upper lip shorter than the lower, all teeth ciliate. Corolla up to 10 mm. long, purplish-pink, the upper lip bifid. $2n = 30$. Fl. 5-8.

Rocky arid places. *Malta*, *Gozo* and *Comino*: very common (S. & C.G.; Borg; G. Lanfranco; Haslam; Wolseley).

Mediterranean region.

15. *Mentha* L.

Perennial herbs with a characteristically scented foliage and creeping rhizome. Flowers hermaphrodite or female, on the same or different plants, usually in dense and many-flowered verticillasters, sometimes forming a long spike or a terminal head. Calyx actinomorphic or weakly 2-lipped, tubular or campanulate, 10-13-veined, with 5 subequal or rarely unequal teeth. Corolla weakly 2-lipped, with 4 subequal lobes, the upper lobe wide and usually emarginate; tube shorter than calyx. Stamens about equal, divergent or ascending under the upper lip of corolla, exerted in some hybrids and in female flowers. Styles-branches subequal. Nutlets ovoid, smooth, reticulate or tuberculate.

- | | | |
|---|--------------------|----|
| 1. Calyx hairy in throat, with distinctly unequal teeth | 1. <i>pulegium</i> | 2. |
| Calyx glabrous in throat, with more or less equal teeth | | |

2. Leaves distinctly petiolate; flowers in a head or oblong; spike 12-20 mm. in diameter
Leaves sessile (rarely shortly petiolate below); flowers in a spike 5-15 mm. in diameter

3. Stem and leaves hairy
Stem and leaves glabrous or sparsely hairy

2. *aquatica* 3.

3. *suaveolens*
4. *spicata*

1. *M. pulegioides* L.

Plate XXXIX

Pleju
Pennroyal

Subglabrous to tomentose perennial 10-40 cm. high, with pungent scent; stems procumbent to ascending. Leaves 8-30 x 4-12 mm., narrowly elliptical, attenuate at base, rarely suborbicular, shortly petiolate, entire or with up to 6 teeth on each side, hairy at least beneath. Bracts like the leaves, usually smaller. Calyx (2-)2.5-3 mm. long; teeth ciliate, the lower teeth subulate, the upper shorter and wider. Corolla (4-)4.5-6 mm. long, lilac. Stamens exserted or included; fertile anthers 0.4 mm. long. Nutlets 0.5-0.75 mm. long, pale brown. $2n = 20$. Fl. 5-8.

Cultivated and waste places, *Malta*, *Gozo* and *Comino*: very common everywhere (S. & C.G.; Borg; G. Lanfranco; Haslam; Wolseley).

Mediterranean region north to Ireland and C. Poland.

2. *M. aquatica* L.

Naghnieh salvagg
Naghnieh taz-żwimiel
Water Mint

Subglabrous to tomentose, often purplish perennial (10-)20-90 cm. high, with strong scent. Rhizomes usually epigeal, green or purple-tinged, not very brittle with small, usually reniform leaves. Leaves (15-)30-90 x (10-)15-40 mm., ovate to ovate-lanceolate, usually truncate, petiolate, serrate. Inflorescence of 2-3 congested verticillasters with inconspicuous bracts. Calyx (2.5-)3-4 mm. long, tubular, with subulate or narrowly triangular teeth. Pedicels hairy. Corolla lilac. Nutlets pale brown. $2n = 96$. Fl. 6-11.

Marshy places, *Malta*: very rare (G. Lanfranco), as at Buskett (S. & C.G.; Borg); Marsa (G.D.; S. & C.G.; Borg).

Europe, northwards to c. 63° N. in Sweden; S.W. Asia; N. and S. Africa; Madeira.

3. *M. suaveolens* Ehrh.
M. rotundifolia auct.

Round-leaved Mint

Hairy perennial 40-100 cm. high, with characteristic sickly-sweet scent. Rhizome hairy, usually epigeal, with very small rugose leaves. First aerial stems of year hairy. Stem erect, branched above the middle, sparsely hairy to densely white-tomentose. Middle cauline leaves (15-)30-45 x (10-)20-40 mm., sessile or very shortly petiolate, strongly rugose, ovate-oblong, oblong to suborbicular, obtuse, cuspidate or rarely acute, widest near the base, serrate with 10-20 teeth (but often apparently crenate due to the teeth being bent down towards the underside of the leaf), hairy above, usually grey or white-tomentose to lanate beneath, the hairs on the lower surface branched, with the basal cell 43-57 μ in diameter. Inflorescence of many, usually congested verticillasters forming a terminal spike 40-90 x 5-10 mm., often interrupted below and usually branched. Calyx 1-2 mm.

long, hairy, campanulate; teeth subequal. Pedicels hairy. Corolla whitish or pink. Fertile anthers 0.28-0.38 mm. long. Nutlets 0.57-0.75 mm. long, dark or reddish-brown, strongly reticulate or rugose. $2n = 24$. Fl. 5-10.

Shady places, *Malta*: rare, Għnien il-Kbir, Buskett, San Anton (S. & C.G.; Borg).

Mediterranean region and W. Europe; cultivated as a pot-herb.

4. *M. spicata* L.
M. viridis (L.) L.

Naghnieh
Spear Mint

Glabrous to hairy perennial with sweet scent, less frequently with pungent scent or musty. Middle cauline leaves (30-50-90 x (7-)15-30 mm., lanceolate or lanceolate-ovate, smooth or rugose, rarely 40-60 x 25-40 mm., ovate or ovate-oblong, strongly rugose, widest near the base, serrate, with regular teeth (rarely the whole leaf strongly crispate). Fl. 5-8.

Malta: Cultivated as a pot-herb and often naturalised (Borg).

Origin unknown, but probably arose in cultivation. Naturalised through a large part of Europe.

16. *Rosmarinus* L.

Evergreen shrubs. Leaves linear, sessile, coriaceous, with revolute margins. Verticillasters few-flowered, in short axillary racemes. Bracteoles 0. Calyx campanulate, 2-lipped, the upper lip entire, the lower 2-lobed. Corolla 2-lipped, exserted, the upper lip strongly concave and bifid, the lower trifid with cochleariform middle lobe. Stamens 2, clearly exserted, parallel, the filaments with small, lateral, recurved tooth near the base; anthers 1-locular. Style long, incurved, unbranched. Nutlets ovoid, smooth.

1. *R. officinalis* L.

Plate XXXIX

Klin
Rosemary

Up to 2 m. high, with erect, ascending or prostrate branches, strongly aromatic. Leaves 15-40 x 1.2-3.5 mm., bright green and rugulose above, white-tomentose beneath. Peduncles and pedicels stellate-tomentose; calyx 3-4 mm. long, green or purplish and sparsely tomentose when young, later 5-7 mm. long, subglabrous and distinctly veined. Corolla 10-12 mm. long, pale blue (rarely pink or white). Nutlets brown. Flowers throughout the year.

Arid rocky places, *Malta*: rather rare (G. Lanfranco), as at Gnejna, Bahrija, Wied Ħazrun, Dwejra, Wied Ġerżuma, Mellieħa (Borg); Wied Babu (S. & C.G.; Borg; Haslam; Wolseley); Wied Qirda, Bingemma (S. & C.G.; Borg; Wolseley); Buskett (Borg; Haslam); Wied il-Ballut, Wied il-Kbir (Gaul); *Gozo*: Wied Bingemma, Wied ir-Rihan, (S. & C.G.; Borg; Wolseley).

Mediterranean region.

17. *Salvia* L.

Herbs or shrubs. Flowers in axillary verticillasters (rarely cymes). Calyx 2-lipped, the teeth unequal; lower lip deeply 2-fid or -dentate; upper lip 3-dentate, rarely subentire. Corolla 2-lipped; upper lip straight or falcate; lower lip 3-lobed, the middle lobe the largest; tube straight or invaginated, with or without a ring of hairs inside. Stamens 2; connective usually articulating with the filament, one

arm with a fertile cell, the other more or less sterile, often expanded and flattened distally (dolabriform). Nutlets 4 or fewer.

1. Leaves simple
At least basal leaves pinnatifid or lobed
2. Corolla 10-25 mm. long
Corolla 6-10(-15) mm. long

1. *officinalis*
2. *triloba*
3. *verbenaca*

1. *S. officinalis* L.

Salvia
Common Sage

Shrub up to 60 cm. high. Stems erect with numerous patent-tomentose branches. Leaves simple, petiolate, oblong, more or less narrowed at base, rugose, white pubescent beneath, greenish above, densely pubescent when young. Verticillasters with 5-10 flowers. Calyx 10-14 mm. long, pubescent, glandular-punctate. Corolla up to 35 mm. long; violet-blue, pink or white. Fl. 4-6.

Cultivated as a pot herb; also native in rocky arid places. *Malta*: rare (G. Lanfranco), as at Mtahleb, Gnien il-Kbir, Buskett (S. & C.G.; Borg); *Bahrija* (Borg).

Mediterranean region.

2. *S. triloba* L. fil.

Three-lobed Clary

Shrub up to 120 cm. high. Stems appressed white-tomentose. Leaves simple, or pinnate with 1-2 pairs of ovate lateral segments and a large oblong-elliptic terminal segment, petiolate, rugose, eglandular, grey-canescens beneath, greenish above. Verticillasters with 2-6 flowers. Calyx 5-8 mm. long, campanulate, toothed, often purple, glandular or eglandular-pubescent. Corolla 16-25 mm. long, lilac or pink, rarely white. Fl. 5-8.

Cultivated as a pot-herb. *Malta*: rare at Luqa, often naturalised in old gardens (Borg).

C. & E. Mediterranean region.

3. *S. verbenaca* L. *S. clandestina* L.

Plate XXXIX

Salvia salvaggia
Salvia tal-Madonna
Wild Clary

Perennial 10-80 cm. high. Stems erect, simple or branched, eglandular-pubescent below, and more or less glandular above. Leaves more or less pinnatifid with broad lobes, oblong to ovate. Inflorescence dense or lax; verticillasters with 6-10 flowers. Bracts less than $\frac{1}{2}$ as long as calyx, green; pedicels 2-3 mm. long. Flowers hermaphrodite or female, sometimes cleistogamous. Calyx 6-8 mm. long, glandular or eglandular, enlarging slightly in fruit. Corolla 6-10(-15) mm. long, blue, mauve or violet. Fl. 10-5.

On exposed rocky ground, roadsides and waste places. *Malta*, *Gozo* and *Comino*: common (S. & C.G.; Borg; G. Lanfranco; Haslam; Wolseley).

Mediterranean region and W. Europe.

LXXXIII. SOLANACEAE

Herbs or shrubs. Leaves simple to pinnate, exstipulate. Flowers actinomorphic or zygomorphic, hermaphrodite. Calyx (3-) 5(-6)-lobed or toothed. Corolla 3- (6- or

10-) lobed, rarely subentire, rotate to campanulate, infundibuliform or tubular; lobes valvate or plicate in bud. Stamens 5(-6), adnate to the corolla-tube and alternating with the lobes. Ovary superior, with 2 (rarely more) loculi; style simple; stigma terminal, entire or 2-lobed. Fruit a capsule or berry, usually 2-locular. Seeds numerous, rarely 2-11.

Many members of this largely extra-European family are grown for their agricultural or horticultural value and it is often very difficult to assess accurately the status of the frequent escapes from cultivation.

- | | |
|---|------------------------|
| 1. Anthers connivent | 2. |
| Anthers not connivent | 4. |
| 2. Corolla campanulate | 4. <i>Withania</i> |
| Corolla rotate | 3. |
| 3. Anthers dehiscing by terminal pores; corolla white or purple | 6. <i>Solanum</i> |
| Anthers dehiscing by longitudinal slits; corolla yellow | 7. <i>Lycopersicon</i> |
| 4. Flowers in panicles | 9. <i>Nicotiana</i> |
| Flowers solitary, in pairs or small clusters, sometimes grouped into spikes | 5. |
| 5. Shrubs | 6. |
| Herb, often woody at base | 7. |
| 6. Spiny shrub; corolla 10-15 mm. long, violet | 2. <i>Lycium</i> |
| Shrubby perennial; corolla 110-180 mm. long, white | 8. <i>Datura</i> |
| 7. Fruit a capsule | 8. |
| Fruit a berry | 9. |
| 8. Flowers in a dense terminal spike | 3. <i>Hyoscyamus</i> |
| Flowers solitary in the leaf-axils | 8. <i>Datura</i> |
| 9. Calyx divided almost to the base | 1. <i>Nicandra</i> |
| Calyx divided to $\frac{1}{2}$ way or less | 5. <i>Physalis</i> |

1. *Nicandra* Adanson

Glabrous annual. Leaves alternate, simple. Flowers actinomorphic, solitary. Calyx strongly accrescent, divided almost to base. Corolla campanulate, lilac to blue. Stamens 5, fertile, inserted at base of corolla, included; anthers dehiscing longitudinally. Stigma capitate. Fruit a 3- to 5-locular, thin-walled, dry berry.

1. *N. physaloides* (L.) Gaertner

Apple-of-Peru

Stems 10-80(-200) cm. high. Leaves 4-15(-37) x 2-10(-30) cm., elliptic-lanceolate to ovate, cuneate at base, obtuse to acute, coarsely and irregularly sinuate-serrate or dentate sometimes somewhat lobed near base. Peduncle 1.5-3.0 cm. long. Calyx 10-20 mm. long, up to 35 mm. long in fruit, the lobes ovate, cuspidate-acuminate, green or scarious; corolla 2-4 cm. in diameter. Berry c. 1.5 cm. in diameter, globose, brown. Fl. 6-9.

Malta: self-sown since 1902 in San Anton gardens and elsewhere (Borg).

Widely cultivated as a garden ornamental and locally naturalised in C., W. and S. Europe; casual elsewhere. Native of Peru.

2. *Lycium* L.

Usually spiny shrubs. Leaves alternate or in clusters, shortly petiolate, entire. Flowers solitary or in small clusters in the leaf-axils, pedicellate. Calyx cupuliform, regularly 5-dentate, or 2-lipped with 2-3 teeth connate. Corolla infundibuliform or subcylindrical. Stamens inserted in throat of corolla-tube. Stigma shallowly 2-lobed. Fruit a berry.

Leaves usually widest above the middle, corolla lobes $\frac{1}{2}$ - $\frac{3}{4}$ as long as the tube

1. *europaeum*

Leaves usually widest below the middle; corolla lobes slightly longer than the tube

2. *chinense*

1. *L. europaeum* L.

Plate XXXIX

Ghawseg
Mediterranean Tea-tree

Plant 1-4 m. high; branches rigid, very spiny; spines stout. Leaves 20-50 x 3-10 mm., usually oblanceolate. Flowers solitary or in clusters of 2(-3). Calyx 2-3 mm. long, 5-dentate or 2-lipped. Corolla 11-13 mm. long, narrowly infundibuliform, pink or white; lobes 3-4 mm. long. Stamens usually exserted; filaments glabrous, somewhat unequal. Fruit red. Fl. 4-5.

Rocky places and field walls. *Malta*: rare, Wardija, Ghemieri (S. & C.G.; Borg); M'iebah, Fort Manoel, fortifications of Valletta and Floriana (Borg); L-Ahrax ta' Gewwa, Maghtab near Ghallis (Wolseley). *Gozo*: Wied il-Ghasri (S. & C.G.; Borg).

Mediterranean region.

2. *L. chinense* Miller

Chinese Tea-tree

Plant up to 2.5 m. high; stems arcuate; spines slender, few. Leaves 10-140 x 5-60 mm., the lower much larger than the upper, lanceolate to ovate, usually widest below the middle. Calyx 3 mm. long. Corolla 10-15 mm. long; broadly infundibuliform, the tube narrowly cylindrical at base for c. 1.5 mm., purple, becoming brownish; lobes c. 5-8 mm. long. Stamens long-exserted; filaments with dense tuft or hairs at base. Fruit red. Fl. 4-7.

Malta: Naturalised in Valletta Main Ditch 1905, spreading to other ditches and fortifications in Valletta, Floriana, Msida, Sliema and St. Julians (Borg); ditch below Mdina (Gauci).

Native of E. Asia; planted and naturalised in Europe.

3. *Hyoscyamus* L.

Annual, biennial or perennial herbs, often viscid. Leaves simple, sessile or petiolate. Flowers solitary, axillary, often grouped into bracteate spikes or racemes. Calyx campanulate-tubular, 5-dentate, 10- or more-veined, accrescent. Corolla usually broadly infundibuliform, with 5 obtuse lobes. Stamens usually slightly exserted, inserted at base of corolla-tube. Ovary bilocular. Fruit a capsule

included in the calyx, circumscissile; seeds numerous, reniform to orbicular.

Caulline leaves sessile, the basal petiolate; corolla usually with dark purple veins

1. *niger*

Leaves all petiolate; corolla without purple veins but sometimes with purplish throat

2. *albus*

1. *H. niger* L.

Henbane

Viscid, velutinous, foetid annual or biennial; stem (10-)30-80 cm. high, erect, simple or branched. Leaves (5-)15-20 cm. long, ovate to ovate-oblong, entire to angled, coarsely dentate or deeply incised, soft, the basal forming a rosette, petiolate, the cauline amplexicaul, sessile. Flowers subsessile, in a dense, unilateral spike; bracts leaf-like. Calyx 1-1.5 cm. long, 10-veined; teeth triangular, acute; fruiting calyx ventricose towards base, with acute teeth. Corolla 2-3 cm. in diameter, slightly zygomorphic, pale yellow, usually with dark purple veins. Anthers 2-3 mm. long, purple. $2n = 34$. Fl. 4-7.

Malta: Attard railway line, 1927 (Borg).

Almost throughout Europe; W. Asia; N. Africa.

2. *H. albus* L.

Plate XXXIX

Mamma żejża
White Henbane

Viscid annual, biennial or perennial; stem 30-90 cm. high, woody below when perennial, erect, branched, densely glandular-villous, the hairs patent. Leaves 4-10 x 3-8 cm., orbicular-ovate, obtuse, cuneate to cordate at base, incised-dentate with wide rounded teeth, sparsely glandular-villous; petiole 2.5-5(-12) cm. long, narrowly winged. Flowers sessile except the lowest, in a dense unilateral spike; bracts leaf-like. Calyx 1-1.5 cm. long, densely glandular-villous; teeth 3 mm. long, broadly triangular; fruiting calyx 2-2.5 cm. long; ventricose below, hypocrateriform above, distinctly 15- to 20-ribbed, with short, triangular, acute, teeth. Corolla 3 cm. long, tubular-campanulate, somewhat zygomorphic, glandular-villous externally; throat greenish or dark purple. Stamens included to slightly exserted; anthers 2-3 mm. long, white or purple. Flowers all the year round.

Arid waste places. *Malta*, *Gozo* and *Comino*: common (S. & C.G.; Borg; G. Lahfranco; Wolseley).

Mediterranean region.

4. *Withania* Pauquy

Shrubs. Leaves alternate or opposite, simple, entire, petiolate. Flowers solitary or in clusters, axillary. Calyx campanulate, 5-dentate, accrescent. Corolla campanulate, 5-dentate. Stamens 5, equal, included, inserted near base of corolla; anthers dehiscing longitudinally. Ovary bilocular, with nectary at base. Fruit a globose berry, surrounded by inflated, persistent calyx; seeds numerous, subreniform.

1. *W. somnifera* (L.) Dunal *Physalis somnifera* L.

Mediterranean *Withania*

Stem 60-120 cm. high, erect, branched, woody below, greyish stellate-tomentose. Leaves 3-10 x 2-7 cm., ovate to obovate or oblong, acute to obtuse, cuneate at base,

subglabrous above, stellate-tomentose, beneath; petiole 1-2 cm. long. Flowers in clusters of 4-6; pedicels up to 5 mm. long. Calyx c. 5 mm. long, densely stellate-tomentose, with triangular teeth; fruiting calyx 10-20 x 8-10 mm, lanceolate, 10-ribbed. Corolla c. 5 mm. long, yellow-green. Stamens connivent; anthers c. 1 mm. long, ovate. Berry 5-8 mm. in diameter, shining, bright red; seeds reticulate, reddish-brown. $2n = 48$. Fl. 5-9.

Malta: Cultivated and long naturalised in gardens as at San Anton (Borg).

Mediterranean region; W. and C. Asia; nearly all of Africa.

5. *Physalis* L.

Annual or perennial herbs. Leaves alternate, opposite or ternate, petiolate. Flowers solitary, axillary. Calyx campanulate, 5-dentate, accrescent. Corolla 5-lobed; rotate or broadly campanulate. Stamens 5, inserted near top of short corolla tube, exerted; anthers dehiscing longitudinally. Ovary bilocular. Fruit a berry, surrounded and usually much exceeded by the inflated calyx; seeds numerous, suborbicular to reniform.

1. *P. peruviana* L.

P. pubescens var. *peruviana* L.

Tuffieħ tal-fanali

Peruvian Cape Gooseberry

Perennial, with dense indumentum of multicellular hairs; stem 30-100 cm. high, simple or branched above. Leaves (5-)7-11(-15) x 4-7(-9) cm., broadly ovate, acuminate, cordate at base, entire or slightly dentate; petiole 1-4 cm. long. Pedicels 7 mm. long. Calyx 8-9 mm. long; teeth $\frac{1}{2}$ total length, acuminate. Corolla 15-25 mm. in diameter, subentire, yellow with dark purple markings. Anthers 3.5-4 mm. long, purple; filaments purple. Fruiting calyx 30-50 mm. long, green, pubescent; berry 12-20 mm. long, yellow. Fl. 5-6.

Malta: cultivated and sometimes naturalised as at Gnejna, Ballut, Ta' Baldu, San Martin, San Anton (S. & C.G.); Attard, Wardija (Borg).

Native of South America. Cultivated for its edible fruits and locally naturalised in C. and S. Europe.

6. *Solanum* L.

Herbs or shrubs, sometimes scrambling or climbing, usually hairy, often with prickles. Leaves alternate, or in pairs, simple to pinnate. Inflorescence axillary, extra-axillary or leaf-opposed, of 1 or more helicoid cymes, usually becoming scorpioid, sometimes cymose umbels, rarely reduced to a single flower; peduncle absent, simple or dichotomously branched. Calyx campanulate, usually 5-fid. Corolla rotate; limb orbicular or pentagonal to stellate, often recurved. Stamens inserted on throat of corolla-tube; anthers exerted, usually connivent, in a cylindrical to ovoid or conical column, dehiscing by 2 terminal pores, later splitting de-currently and introrsely. Ovary 2-locular; styles simple; stigma entire to bifid. Fruit a succulent to dry berry, 2- to 4-locular; seeds numerous, small, ovoid, compressed.

1. Shrubby perennial; stems with stout yellow prickles
Subglabrous to villous annuals, without prickles

4. *sodomaeum*

2.

2. Leaves interruptedly imparipinnate; underground
stolons and tubes present

3. *tuberosum*

Leaves entire to sinuate-dentate; stolons and tubes
absent

3.

3. Cymes (3-)5- to 10-flowered; peduncles (10-)10-28 mm.
long; berry globose or wider than long, black or green
Cymes 3- to 5-flowered; peduncles (4-) 7-13 (-19) mm.
long; berry usually longer than wide, red, orange or
yellow

3. *nigrum*

2. *luteum*

1. *S. nigrum* L.

Plate XL

Għeneb id-dib

Black Nightshade

Subglabrous to villous annual up to 70 cm. high, with simple hairs; stems decumbent to erect. Leaves 2.5-7 x 2-4.5(-6) cm., ovate-rhombic to lanceolate, entire to sinuate-dentate. Cymes (3-)5- to 10-flowered, lax, solitary; peduncles (10-)14-28 mm. long, usually erecto-patent in fruit, the pedicels usually much shorter, recurved in fruit. Calyx 1-2.5 mm. long, slightly accrescent, deflexed or adhering to base of berry; lobes usually ovate. Corolla (8-) 10-14(-18) mm. in diameter, usually 1-3 times as long as calyx, white. Anthers 1.5-2.5 mm. long, yellow. Berry 6-10 mm. in diameter, usually wider than long, dull black or green; seeds 1.7-2.4 mm. long. $2n = 72$. Flowers all the year round.

Waste places and road margins. *Malta*, *Gozo* and *Comino*: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Throughout most of the world as a weed of cultivation.

2. *S. luteum* Miller subsp. *luteum*

S. nigrum var. *miniaturum* Bernh.

Għeneb id-dib

Yellow Nightshade

Subglabrous to pubescent annual up to 50 cm. high, with simple, glandular hairs, usually appressed; stems angled, with dentate ridges, decumbent to erect. Leaves 2-7 x 1.5-4 cm., rhombic to ovate-lanceolate, entire to sinuate-dentate. Cymes 3- to 5-flowered, lax, solitary; peduncles (4-)7-12(-19) mm. long, the pedicels often longer and deflexed in fruit. Calyx 1-2.5 mm. long, slightly accrescent, deflexed or adhering to base of berry; lobes triangular. Corolla 8-16 mm. in diameter, 3-5 times as long as calyx, white. Anthers 1.5-2.5 mm. long, yellow. Berry 6-10 mm. in diameter, usually longer than wide, red, orange or yellow; seeds 1.6-2 mm. in diameter. $2n = 48$. Fl. 4-11.

Waste places and disturbed ground. *Malta*: frequent in the same localities as *S. nigrum* (Borg; G. Lanfranco).

Most of Europe; W. Asia; N. Africa.

3. *S. tuberosum* L.

Patata

Potato

Sparsely pubescent annual with simple, appressed hairs, with underground stolons bearing terminal tubers; stems 30-80 (-150) cm. high, erect, branched, succulent, winged. Leaves interruptedly imparipinnate, with 3-5(-7) pairs of ovate, acuminate leaflets between which are smaller, unequal, ovate to orbicular leaflets; petiole with auricular or semi-lunate false stipules at base. Cymes many-flowered, 2-4 on axillary to extra-axillary branched peduncles 50-100 mm. long; pedicels 20-35 mm. long, usually articulated in middle half. Calyx 5-10 mm. long; teeth lanceolate,

acuminate. Corolla 25-35 (-40) mm. in diameter, orbicular to pentagonal, white, purple or blue to violet or pinkish. Anthers 6-7 mm. long, yellow to orange. Berry 20-40 mm. in diameter, more or less globose, succulent, greenish to purplish. $2n = 48$.

Malta and Gozo: extensively cultivated for its edible tubers, for home consumption and export, on 15-20% of cultivated land (Borg; Bowen-Jones et al.).

Native of S. America.

4. *S. sodomaeum* L.

Brown Nightshade

Shrubby perennial; stem 50-300 cm. high or more, stout, erect, much-branched, sparsely stellate-pubescent, with many straight, wide-based yellow prickles up to 1.5 cm. long. Leaves 5-13 x 4-9 cm., more or less ovate, pinnatisect almost to midrib, with many prickles, sparsely stellate-hairy above, more densely so beneath; lobes rounded, sinuate; petioles 1-3 cm. long. Cymes few-flowered, solitary, extra-axillary, sessile; pedicels c. 10 m. long, elongating and recurved in fruit; upper flowers smaller, male. Calyx 5-7 mm. long, accrescent in hermaphrodite flowers; lobes lanceolate. Corolla 25-30 mm. in diameter, orbicular-pentagonal, pale violet. Anthers 5-6 mm. long, equal. Berry 15-30 mm. in diameter, globose, dry, yellow to brown, shining. $2n = 24$. Fl. 4-10.

Waste places. *Malta*: Mosta near Victoria Lines, San Pawl tat-Targa (Borg); Argotti gardens (Wolseley).

Native of Africa; widely naturalised in S. Europe.

(*S. elaeagnifolium* Cav. a perennial herb or dwarf shrub with dense whitish stellate tomentum and scattered reddish prickles on stem; leaves 4-10(-16) x 2.5(-4) cm., more or less linear, entire to shallowly sinuate; anthers 7-9 mm. long, has been recorded by G. Lanfranco around Harbour areas in Malta).

7. *Lycopersicum* Miller

Erect to decumbent, branched annuals with glandular aromatic indumentum. Leaves interruptedly imparipinnate. Flowers in one or more extra-axillary, often leaf-opposed, monochasial cymes; peduncles simple or dichotomously branched; pedicels articulated near the middle, deflexed in fruit. Calyx 5-lobed, divided almost to base, accrescent, deflexed in fruit. Corolla rotate, with 5(6)-lobed limb, yellow. Stamens inserted on throat of corolla; filaments very short; anthers united laterally, with introrse, longitudinal dehiscence, and with connective prolonged into a prominent sterile beak. Style straight. Fruit a 2- to 3-(to multi)-locular berry; seeds numerous, elliptical, compressed, enclosed in a mucilaginous sheath.

1. *L. esculentum* Miller

Plate XL

Tadam
Tomato

Plant villous. Leaves at least 20 cm. long; leaflets ovate to ovate-lanceolate, irregularly incised-serrate to pinnatisect, somewhat glaucous beneath. Cymes 3- to 20-flowered. Corolla up to 2.5 cm. in diameter. Berry 2-10 cm in diameter, globose, ovoid, pyriform, depressed or irregular with bulges and ridges, densely glandular-villous when young, becoming glabrous, red to pink or yellowish; seeds papillose. $2n = 24$.

Widely cultivated, naturalised locally. *Malta*: cultivated at farmsteads and locally as at Mtaħieb, Fiddien Valleħ (Wolseley); Marfa, Mellieħa, Wied il-Għasel (Bowen-Jones et al.). *Gozo*: extensively cultivated as at Ramla, San Blas and Dahlet Qorrot

(Bowen-Jones et al; Wolseley); naturalised at Xlendi (Haslam).

Native of S. and C. America. Widely cultivated and sometimes naturalised in many parts of the Old and New World.

8. *Datura* L.

Erect annuals. Leaves alternate, simple, shortly petiolate. Flowers actinomorphic, solitary, axillary. Calyx tubular, often 5-angled, 5-dentate, circumscissile often flowering, the upper part deciduous, the lower part persisting as disc or cup under the fruit. Corolla tubular or infundibuliform, much exceeding calyx, the limb 5(-10) lobed. Stamens 5, equal, included or exserted; inserted near base of corolla-tube; anthers dehiscing longitudinally. Stigma 2-lobed. Ovary 2-locular, sometimes 4-locular at base. Fruit a capsule, dehiscing regularly by 4 valves or irregularly; seeds many.

1. *D. metel* L.

Plate XL

Stramonjum abjad
Garden Thorn Apple

Plant 30-200 cms. high, or more, glabrous. Leaves 5-16 x 3.5-11 cm., ovate, unequally truncate to cuneate at base, entire. Calyx 60-95 mm. long, the teeth 11-25 mm. long, unequal, linear-triangular, acute; corolla 11-18 cm. long, cylindrical, white, the limb 5-dentate; style 13-17 mm. long. Capsule 5.5-6.5 cm. in diameter, ovoid, with short spines or tubercles. Fl. 5-12.

Malta: frequently cultivated for ornament (Borg; Wolseley), locally naturalised as at Valletta Main Ditch, San Anton (Borg).

Origin unknown. Frequently cultivated and locally naturalised in the Mediterranean region.

9. *Nicotiana* L.

Annual to perennial herbs, rarely shrubs. Leaves alternate, simple. Flowers actinomorphic or zygomorphic, in terminal panicle or false-raceme. Calyx subglobose to cylindrical, sometimes campanulate or cupuliform, 5-dentate, persistent, often somewhat inflated in fruit. Corolla tubular or infundibuliform; limb 5-lobed (rarely subentire). Stamens 5, subequal or 1 shorter, included or rarely slightly exserted; anthers dehiscing longitudinally. Stigma capitate. Fruit a capsule, dehiscing by 2 or 4 distal valves; seeds many.

1. *N. glauca* R.C. Graham

Plate XL

Tabakk tas-Swar
Glaucous Tobacco

Glabrous shrub (1-2-6(-10) m. high. Leaves 5-25 cm. long, elliptical to lanceolate or ovate, acute, cuneate to subcordate at base, entire to somewhat sinuate, glaucous; petiole not winged. Flowers numerous in a lax panicle. Calyx 10-15 mm. long, tubular, with triangular, acute, equal teeth, much shorter than the tube. Corolla (25-)30-40(-45) mm. long, tubular, yellow, the limb 2-4 mm. long, shortly 5-toothed; stamens subequal, included, inserted in basal $\frac{1}{4}$ of corolla-tube. Capsule 7-10 mm. long, ellipsoid. Fl. 4-10.

Cultivated for ornament and widely naturalised in waste places, and on walls. *Malta* and *Gozo*: (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Native of Argentina and Bolivia. Cultivated for ornament and widely naturalised in the Mediterranean region.

(*N. longiflora* Cavanilles an annual or short-lived perennial, with corolla tube 40-120 mm. long has been recorded by G. Lanfranco in waste places in the north of Malta).

LXXXIV. SCROPHULARIACEAE

Herbs, rarely shrubs. Leaves simple (though sometimes deeply lobed), exstipulate, alternate or opposite (rarely all basal, or the uppermost whorled). Flowers zygomorphic (though sometimes only very slightly), usually in bracteate spikes or racemes, less often solitary in the leaf-axils or in cymes. Calyx usually 4- or 5-lobed, sometimes 2-lipped. Corolla (4)5 (8)-lobed or 2-lipped. Stamens usually 2 or 4, rarely 3.5 or 6-8; staminodes sometimes present. Ovary superior, 2-locular (sometimes 1-locular in upper part and rarely throughout); style single; stigma usually capitate. Fruit a capsule; seeds usually numerous.

- | | |
|---|--------------------------|
| 1. Corolla shortly tubular, limb rotate, 4-5 lobed | 2. |
| Corolla tubular, more or less distinctly 2-lipped | 3. |
| 2. Fertile stamens 4 or 5 | 1. <i>Verbascum</i> |
| Fertile stamens 2 | 8. <i>Veronica</i> |
| 3. Corolla-tube with a spur, pouch or gibbosity at the base on the adaxial side | 4. |
| Corolla-tube symmetrical at base, without spur, pouch or gibbosity | 8. |
| 4. Capsule dehiscent by longitudinal slits | 5. |
| Capsule dehiscent by 2-3 apical pores | 6. |
| 5. Leaves palmately veined, reniform to suborbicular peltate | 6. <i>Cymbalaria</i> |
| Leaves not palmately veined, usually narrow, more or less sessile | 7. <i>Linaria</i> |
| 6. Corolla-tube with a narrow spur at the base | 5. <i>Kickxia</i> |
| Corolla-tube with a broad pouch at the base | 7. |
| 7. Perennial; calyx more or less equally lobed, longer than corolla-tube | 3. <i>Antirrhinum</i> |
| Annual; calyx unequally lobed, longer than corolla-tube | 4. <i>Misopates</i> |
| 8. Corolla-tube subglobose; flowers pedicellate in lax cymes | 2. <i>Scrophularia</i> |
| Corolla-tube parallel-sided, flowers subsessile in a spike-like racemes | 9. |
| 9. Seeds 1-2 mm. in diameter, longitudinally ridged or striate | 9. <i>Bellardia</i> |
| Seeds c. 0.5 mm. in diameter, smooth or finely reticulate | 10. <i>Parentucellia</i> |

1. *Verbascum* L.

Herbs, very rarely small shrubs. Leaves simple, alternate (very rarely opposite), the basal forming a rosette. Flowers actinomorphic or very slightly zygomorphic, in terminal racemes, spikes or panicles. Calyx equally 5-lobed. Corolla usually yellow, with a very short tube and a rotate, nearly equally 5-lobed limb. Stamens 4 or 5 (sometimes 4 fertile and 1 staminode); filaments usually villous. Capsule septicidal; seeds numerous, oblong-pyramidal, alveolate.

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|---|-------------------|
| 1. Plant glandular-pubescent; corolla 40-50 mm. in diameter | 1. <i>cretica</i> |
| Plant grey-yellow tomentose; corolla 12-35 mm. in diameter | 2. |

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|--|--------------------|
| 2. Calyx 8-12 mm. long; filament hairs white | 2. <i>thapsus</i> |
| Calyx 2-4 mm. long; filament hairs violet | 3. <i>sinuatum</i> |

- | | |
|--------------------------------|-------------------|
| 1. <i>V. cretica</i> (L.) Cav. | Glandular Mullein |
| <i>Celsia cretica</i> L. | |

Biennial, glandular-pubescent and also with somewhat longer non-glandular hairs; stem 40-150 cm. high. Basal leaves 15-25 x 4-7 cm., oblong, crenate-dentate to somewhat pinnatifid. Inflorescence simple. Bracts 12-25 mm. long, ovate, acuminate, serrate; pedicels 3-6 mm. long. Calyx 8-15 mm. long; lobes serrate. Corolla 40-50 mm. in diameter; stamens 4, without staminode, unequal, the lower with decurrent anthers 5-6 mm. long; filament-hairs violet. Style 20-25 mm. long. Capsule 9-15 mm. long, ellipsoidal-globose. Fl. 4-6.

Valleys and cultivated places, sporadic. *Malta*: rare. Girgenti (S. & C.G.; Borg; Gauci); Ghajin il Kbir (Borg). *Gozo*: Gniien Imrik (S. & C.G.; Borg); Pergla (Gulia; Borg).

W. Mediterranean region.

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|-------------------------|---------------|
| 2. <i>V. thapsus</i> L. | Great Mullein |
|-------------------------|---------------|

Biennial, more or less densely grey-tomentose; stem 30-200 cm. high. Basal leaves 8-50 x 2.5-14 cm., elliptic to obovate-oblong, obtuse, entire or finely crenate; upper cauline leaves decumbent. Inflorescence usually simple. Bracts 12-18 mm. long, ovate to lanceolate, acuminate; pedicels partly adnate to the stem. Calyx 3-12 mm. long; lobes lanceolate. Corolla 12-35 mm. in diameter. Stamens 5, the upper with villous filaments the lower with glabrous to villous filaments and decurrent anthers; filament-hairs white. Stigma capitate. Capsule 7-10 mm. long, elliptic-ovoid, $2n = 34, 36$. Fl. 5-8.

Naturalised in gardens and elsewhere. *Malta*: San Anton (S. & C.G.; Borg); Wied Bellut, Corradino (G.D.; Borg). *Gozo*: Marsalforn (Gulia).

Most of Europe except the extreme north; Asia.

- | | | |
|--------------------------|-----------|---------------------|
| 3. <i>V. sinuatum</i> L. | Plate XLI | Xatbet landar |
| | | Wavy-leaved Mullein |

Biennial, shortly but densely grey to yellow-tomentose, sometimes glandular in inflorescence; stem 50-100 cm. high. Basal leaves 15-25 x 6-15 cm., oblong-spatulate, sinuate-pinnatifid, often somewhat undulate, sessile or very shortly petiolate. Inflorescence freely branched, lax. Bracts 3-8 mm. long, cordate-deltate, shortly cuspidate; longest pedicels 2-5 mm. long. Calyx 2-4 mm. long; lobes lanceolate. Corolla 15-30 mm. in diameter. Stamens 5; anthers all reniform; filament hairs violet. Capsule 2.5-4 mm. in diameter, subglobose. $2n = 30$. Fl. 5-8.

Fields and waste places, particularly roadsides. *Malta*, *Gozo* and *Comino*: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Most of Europe; N. Africa; W. Asia

2. *Scrophularia* L.

Herbs or small shrubs; stems erect or ascending, 4-angled or terete. Leaves usually opposite, entire to 2-pinnatisect. Flowers in cymes (sometimes reduced to a single flower) in the axils of leaf-like or reduced bracts, forming more or less distinct terminal panicles or racemes. Calyx equally 5-lobed. Corolla with a short, more or less globose tube and usually 2-lipped limb. Fertile stamens 4; the fifth (adaxial) stamen usually represented by a scale-like staminode, rarely absent. Fruit a septicidal capsule. Seeds numerous, ovoid, rugose.

Stems not winged on the angles; calyx lobes acute without scarious margin

1. *peregrina*

Stems winged on the angles; calyx lobes more or less dentate with broad scarious margin

2. *auriculata*

1. *S. peregrina* L. Plate XLII Fiswiet il-Kelb, Nittiena Brown Figwort

Glabrous or subglabrous annual; stems 15-90 cm. high. Leaves up to 16 x 6 cm., ovate, irregularly serrate, acute to subobtusate, cordate, truncate, rarely rounded at the base. Bracts mostly leaf-like; pedicels 2-3 times as long as calyx; glandular. Calyx lobes ovate-lanceolate, acute; margin not scarious. Corolla 6-9 mm. long, dark red to purplish-brown. Staminode obovate-orbicular, obtuse. Capsule c. 6 mm. long, subglobose, subacute. Fl. 3-5.

Cultivated ground and shaded waste places. *Malta*, *Gozo* and *Comino*: common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region.

2. *S. auriculata* L. Water Figwort
S. aquatica auct., non L.

Glabrous, rarely somewhat pubescent perennial; rhizome not nodular; stem 50-100 cm. high, 4-angled, the angles produced into wings c. 1 mm. wide. Leaves 5-12 (-25) cm. long, simple or with one (rarely more) pairs of small lobes at the base, ovate to elliptical, crenate, the lower obtuse, the upper subacute, truncate to subcordate at base. Bracts mostly linear, not leaf-like; pedicels up to twice as long as calyx; glandular. Calyx lobes ovate-orbicular, serrate, glabrous; margin broadly scarious. Corolla (5-)7-9 mm. long, greenish, with purplish-brown upper lip. Staminode more or less orbicular, scarcely emarginate. Capsule 4-6 mm. long, subglobose, obtuse, mucronate. $2n = 78, 80$. Fl. 4-5.

Shady, damp places, occasionally occurring in gardens and irrigated ground. *Malta*: Għnien il-Kbir (S. & C.G.; Borg); Għajn il-Kbir, Mellieħa (Borg); Baħrija (Gauci).

W. Europe; N.W. Africa.

3. *Antirrhinum* L.

Dwarf shrubs, or perennial herbs somewhat woody at the base, leaves simple, entire, pinnately veined, variable in arrangement but usually opposite below and alternate above. Flowers zygomorphic, in terminal, bracteate racemes, or solitary in the axile of foliage-leaves. Calyx deeply and more or less equally 5-lobed, shorter than corolla-tube. Corolla glandular-pubescent outside; tube cylindrical, wide, produced abaxially at the base into a short pouch; limb 2-lipped, the upper

lip 2-lobed, the lower 3-lobed and with a prominent palate which closes the mouth of the tube at its base. Stamens 4, didynamous, included in corolla-tube. Stigma capitate. Capsule with unequal loculi, the adaxial longer, narrower above, and dehiscing with a single apical pore, the abaxial shorter, wider above, and with 2 apical pores.

- Corolla 17-25 mm. long, pale yellow, rarely striped with red 1. *siculum*
Corolla 30-45 mm. long, pink or purple 2. *majus*

1. *A. siculum* Miller Papoċċi bojod, Ras il-mewt
Sicilian Snapdragon

Perennial herb, glabrous except for glandular-pubescent inflorescence. Stems 20-60 cm. high, erect, freely branched, often with many of the branches represented by short, axillary tufts of leaves. Leaves 20-60 x 2-6 mm., linear to narrowly elliptical, opposite below, alternate above, the lower bracts transitional to foliage-leaves, the upper c. 5 mm. long, about equalling pedicel. Calyx lobes 5 mm. long, ovate-lanceolate, subacute. Corolla 17-25 mm. long, pale yellow, rarely striped with red. Capsule 10-12 mm. long, ovoid, glandular-pubescent.

Rocks and walls. *Malta*, *Gozo* and *Comino*: common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Sicily, ?S.W. Italy; naturalised elsewhere.

2. *A. majus* L. Plate XLI Papoċċi yomor, Ras il-baqra
Snapdragon

Perennial herb, glabrous below, glabrous or glandular-pubescent in inflorescence. Stems up to 120 cm. high, erect. Leaves 10-70 x 7-25 mm., linear to ovate-lanceolate, 2.8-12 times as long as wide, distinctly cuneate at base. Bracts 2-8 mm. long, ovate. Pedicels 2-6 mm. long. Calyx lobes 6-8 mm. long, ovate to suborbicular, obtuse. Corolla 30-45 mm. long, usually pink or purple. Capsule 10-15 mm. long, oblong, glandular-pubescent or glabrous. Fl. 1-10.

Two subspecies occur. Subsp. *majus* has stems erect, branched; leaves 30-70 x 5-20 mm., elliptic-lanceolate to linear-oblong, widest near the middle, the upper ones alternate; inflorescence glandular-pubescent; corolla 33-45 mm. long, purplish-pink with yellow palate, rarely (var. *striatum* (DC.) Benth.) pale yellow veined with red. Subsp. *tortuosum* (Bosc) Rouv has stems erect or straggling, sometimes with twining branches; leaves 10-60 x 1.5(-10) mm., linear to linear-oblong, the uppermost often opposite; inflorescence glabrous or glandular-pubescent; corolla 30-37 mm. long, purplish-pink, with white or yellow palate.

Rocky ground and old field walls. *Malta*: frequent (S. & C.G.; Borg; Wolseley). *Gozo*: less frequent (Borg). *Comino*: Borg.

W. Mediterranean region; naturalised elsewhere. Commonly cultivated in many colour and habit varieties.

4. *Misopates* Rafin.

Like *Antirrhinum* but annual; calyx lobes conspicuously unequal, all longer than the corolla-tube; seeds somewhat flattened, with one face smooth, keeled, and produced into a narrow wing, the other finely tuberculate and with a wide, raised, sinuate, papillose border.

1. *M. orontium* (L.) Rafin. Plate XLI Papoċċi raiqa, Papoċċi tar-raba
Lesser Snapdragon

Stem erect, 20-75 cm. high, sparingly branched, glandular-pubescent. Leaves 20-45 x 2-7 mm., linear to oblong-elliptical, subacute, shortly petiolate, opposite below, alternate above. Flowers in a usually lax, terminal raceme; bracts similar to leaves but decreasing in size upwards; pedicels very short in flower, up to 4 mm. long in fruit. Calyx 10-18 mm. long; lobes linear, the longest about 1.5 times as long as the shortest. Corolla 12-20(-30) mm. long, pink or white. Capsule 8-9 mm. in diameter, ovoid, gibbous. $2n = 16$, Fl. 3-6.

Cultivated and occasionally waste places. *Malta* and *Gozo*: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Europe (except Iceland and Faeroes, casual in Norway) and the Mediterranean region, extending east to the Himalayas and south to the Canaries and Abyssinia.

5. *Kickxia* Dumort.

Annual or perennial herbs; stems usually procumbent or climbing. Leaves alternate (the lowest sometimes opposite), ovate, hastate or sagittate. Flowers zygomorphic, solitary in leaf-axils (rarely aggregated into spike-like racemes on lateral branches). Calyx with 5 subequal lobes. Corolla and stamens as in *Linaria*. Capsule more or less globose, with 2 equal loculi, each opening by a single large pore with detachable lid. Seeds alveolate or tuberculate.

1. All leaves rounded or cordate at the base, without lobes or auricles

At least some leaves hastate or sagittate

2. Seeds tuberculate; wall of capsule rather thick and rigid; spur strongly curved

Seeds alveolate; wall of capsule thin, not rigid; spur more or less straight

3. *spuria*

2

1. *commutata*

2. *elatine*

1. *K. commutata* (Bernh. ex Reichenb.) Fritsch Plate XLI Xatbet l-art

Linaria commutata Bernh. ex Reichenb.

Mediterranean Fluellen

Perennial; stems 20-70 cm. long, numerous, procumbent, rooting, glandular-villous. Leaves villous, the lower broadly ovate, the middle and upper ovate-hastate to lanceolate-sagittate; petiole not more than half as long as lamina. Pedicels up to 3 cm. long in flower, filiform, glabrous, patent. Calyx 4-5 mm. long; lobes linear-lanceolate, acute, hispid. Corolla 11-15 mm. long, whitish with bluish-violet upper lip, yellow lower lip and purple-spotted palate; spur strongly curved. Capsule 2.5-4 mm. long, globose, wall rather thick and rigid. Seeds 0.75 - 1 mm. in diameter, tuberculate. Fl. 6-9.

Walls of fields and cultivated waste places. *Malta*: locally frequent (G. Lanfranco; Wolseley), as at Hemsija, Rabat, Fiddien (Borg).

Mediterranean region, extending to S.E. Bulgaria.

2. *K. elatine* (L.) Dumort.

Linaria elatine (L.) Miller

Xatbet l-art

Sharp-leaved Fluellen

Glandular-pubescent to hirsute annual; stems branched from the base. Leaves ovate, sagittate or hastate; petiole not more than half as long as lamina. Calyx-

lobes lanceolate, acuminate. Corolla 7-15 mm. long, yellowish or bluish, with violet upper lip. Capsule 4-4.5 mm. long, seeds alveolate. Fl. 6-9.

Two subspecies occur. Subsp. *elatine* has main branches decumbent, weak, often rather sparsely hairy; secondary branches few or none; leaves acute to mucronate, mostly hastate but the uppermost sagittate. Pedicels glabrous except just below the flower, 2-6 times as long as the calyx in flower, up to 3 cm. long in fruit; corolla 7-10 mm. long. $2n = 36$. Subsp. *crinata* (Mabille) W. Greuter (*Linaria suberi* Reichenb.) has the main branches ascending relatively stout, densely hairy, usually with several short, patent, flowering secondary branches; leaves more or less obtuse, the lower ovate to indistinctly hastate, the middle and upper usually hastate; pedicels hairy throughout, 2.5-3 times as long as calyx in flower, not more than 2 cm. long in fruit; corolla up to 15 mm. long.

In fields after harvest. *Malta*: locally frequent (G. Lanfranco), as at Siggiewi, Ta' Brija, Zebbug, Mosta, Baskett, Hemsija (Borg). *Gozo*: Xlendi, Munxar (Wolseley).

Europe, except Iceland and Faeroes; Mediterranean region; Atlantic Islands; naturalised in N. America.

3. *K. spuria* (L.) Dumort.

Linaria spuria (L.) Miller

Xetbet l-art

Round-leaved Fluellen

Glandular-pubescent to villous annual; stems 20-50 cm. high, decumbent. Leaves up to 7.5 cm. long, entire or remotely denticulate, the lower broadly ovate, truncate or rounded at base, obtuse, the middle and upper ovate-lanceolate to suborbicular-cordate, mucronate; petiole very short. Pedicels 1-2 cm. in flower, villous. Calyx lobes accrescent, acute, more or less cordate at base in fruit. Corolla 10-15 mm. long, yellow, with deep purple upper lip; spur curved. Capsule depressed-globose. Seeds oblong-ellipsoid, alveolate. Fl. 5-9.

All the plants of the Maltese Islands are probably referable to subsp. *integrifolia* (Brot.) M. Fernandes.

In fields after harvest. *Malta* and *Gozo*: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley).

S., W. & C. Europe; Mediterranean region; Atlantic Islands.

6. *Cymbalaria* Hill

Herbs, normally short-lived perennials but often flowering in their first year and sometimes behaving as annuals; stems procumbent to decumbent. Leaves reniform to suborbicular, petiolate, palmately veined, entire to palmately lobed. Flowers zygomorphic, solitary in leaf-axils. Calyx deeply 5-lobed; segments somewhat unequal. Corolla, stamens and capsule as in *Linaria*. Seeds usually fairly numerous, variously tuberculate, rigid or alveolate.

1. *C. muralis* P. Gaertn., B. Mayer & Scherb. Plate XLI Ivy-leaved Toadflax

Linaria cymbalaria (L.) Miller

Glabrous to villous. Stems up to 60 cm. high; middle and upper internodes about equal. Leaves up to 55 x 65 mm., but more usually c. 12 x 13 mm., alternate, reniform to semicircular, rarely suborbicular, with 5-7 rounded to deltate, often mucronate lobes. Calyx 2-2.5 mm. long. Corolla 9-15 mm. long, lilac to violet with yellow palate, rarely white; spur 1.5-3 mm. long, about as long as calyx. Capsule

glabrous, usually exceeding calyx. Seeds c. 1 mm. long, broadly ellipsoid to globose, black, ornamented with high, acute ridges and usually a few tubercles. $2n = 14$. Fl. 2-4.

Shady walls and rocks. *Malta*: rare (G. Lanfranco), as at Wied Babu, Fawwara, St. Julian's (GD.; Borg); Attard, Mosta, Balzan (Borg); Adollorata cemetery, Argotti gardens (Gauci).

Native in S. Alps, W. Yugoslavia, C. & S. Italy and Sicilia; cultivated for ornament and naturalised elsewhere.

(*Chaenorhinum minus* (L.) Lange was found at Wied Babu by Zerafa and by Penza in 1919 (Borg).

7. *Linaria* Miller

Annual to perennial herbs; leaves simple, entire, sessile, usually narrow, variable in arrangement but usually verticillate below and alternate above. Flowers zygomorphic, in terminal, bracteate racemes or spikes, rarely solitary in the axils of foliage-leaves. Calyx deeply, often unequally 5-lobed, the adaxial lobes usually the longest, very rarely the shortest. Corolla usually glabrous except for the palate; tube cylindrical, produced at the base into a conical or cylindrical spur; limb 2-lobed, the lower 3-lobed, with at its base a more or less prominent, usually pubescent palate which usually closes the mouth of the tube. Stamens 4, didynamous, included in the corolla-tube. Capsule more or less globose, with equal loculi, dehiscing by meridional fissures in the apical half. Seeds numerous.

1. Flowers subsessile; corolla 20-30 mm. long
Flowers pedicellate, at least in fruit; corolla 12-17 mm. long
2. Spur short, 1.5-3 mm. long
Spur long, 7-11 mm. long
3. Spur 7-8 mm. long; corolla bluish
Spur 8-11 mm. long; corolla white

2. *triphylla*

2.

4. *arvensis*

3.

1. *pseudolaxiflora*

3. *chalepensis*

2. *L. pseudolaxiflora* Lojac.

Malta Toadflax

Glabrous annual; stems 5-22 cm. long, many decumbent, simple. Leaves up to 10 x 4 mm.; elliptical to narrowly oblanceolate, subacute, verticillate below, alternate above. Racemes capitate, with 1-5 flowers; pedicels c. 6 mm. long, much longer than bracts. Calyx 3-4.5 mm. long; lobes narrowly oblong, subacute, unequal. Corolla 15-17 mm. long, mainly blue; spur 7-8 mm. long; straight; lobes of upper lip erect. Capsule 3.5-5 mm. in diameter. Seeds 0.6-0.9 mm. in diameter, ovoid-subreniform, slightly flattened, strongly ruminant, black. Fl. 3-5.

Old walls and rocky arid places. *Malta*: frequent (S. & C.G.; G. Lanfranco) as at Valletta Glacis, Delimara, Minsija, Bingemma, Selmun, Qrendi near Wied Hoxt (Borg); Wardija at il-Qolla, Mellieha at Qasam Barrani (Gauci). *Gozo*: Ggantija, Nadur (Borg); Gran Castello (Borg; E. Lanfranco). *Comino*: (Borg); *Cominotto*: (Duthie; Borg).

Linosa and Lampedusa.

2. *L. triphylla* (L.) Miller

Plate XLI

Three-coloured Toadflax

Glabrous, somewhat glaucous annual; stems 10-45(-65) cm. high, usually single, erect, simple or branched above. Leaves 15-35 x 10-25 cm., elliptical or obo-

ate, truncate or semiapiculate at base, mostly verticillate but some opposite or alternate. Racemes fairly dense, greatly elongating in fruit; flowers subsessile. Calyx 9-12 mm. long; lobes ovate to lanceolate, obtuse to acute, unequal. Corolla 20-30 mm. long, white (rarely pale yellow or violet), with orange palate and violet spur; spur 8-11 mm. long, curved. Capsule c. 8 mm. in diameter. Seeds c. 1.5 mm. long, pyramidal, strongly ruminant-alveolate, greyish brown, with acute angles. Fl. 2-4.

Fields, especially among Sulla and in open places. *Malta* and *Gozo*: frequent (S. & C.G.; Borg; G. Lanfranco; Wolsely).

Mediterranean region.

3. *L. chalepensis* (L.) Miller

Mediterranean Toadflax

Glabrous annual; stem (10-)20-40 cm. high, usually single, simple or sparingly branched. Leaves 18-35 x 1-2 mm., linear, subobtusate, alternate. Racemes very lax; pedicels 1-2 mm. at anthesis, up to 4 mm. in fruit, mostly shorter than bracts. Calyx 7-10 mm. long; lobes linear, acute, unequal (the adaxial shorter). Corolla 12-16 mm. long, white; spur 8-11 mm. long, curved; mouth of tube open. Capsule 4-5 mm. in diameter. Seeds 1-2 mm., pyramidal, strongly ruminant. Fl. 3-5.

Fields and open places. *Malta*: B'Kara, Delimara, Mellieha (S. & C.G.; Borg); Wied il-Ghasel, Balluta (S. & C.G.); Wied il-Ghomor, Pwales (GD.); Buskett, Wardija, San Martin, Ghajn Znuber, Qasam Barrani, Girgenti, Ghajn il-Kbira, Tarxien, Wied Incita (Borg).

Mediterranean region; W. Asia.

4. *L. arvensis* (L.) Desf.

Field Toadflax

Glaucous annual, glabrous except in inflorescence; stems 0-50 cm. high, erect. Leaves 7-20(-30) x 0.5-2 mm., linear, verticillate below, alternate above. Racemes glandular-pubescent, dense in flower, lax in fruit; bracts linear-oblong to ovate-elliptical; pedicels 1-2 mm. long. Calyx 3-4 mm. long; lobes linear-oblong to ovate-elliptical; pedicels 1-2 mm. Corolla 4-7 mm. long, pale lilac-blue; spur 1.5-3 mm. long, strongly curved. Capsule 4-6 mm. long. Seeds 1-1.5 mm., suborbicular to reniform, dark brownish-grey; wing broad; disc smooth, minutely tuberculate. Fl. 3-5.

Cultivated ground, particularly fields of Sulla (Borg). *Malta*: rare (G. Lanfranco), as at Zeitun, Kalkara, Luqa (Borg).

C. & S. Europe, N. Africa; W. Asia; naturalised elsewhere.

8. *Veronica* L.

Herbs, sometimes woody at base. Leaves simple, entire to 2-pinnatisect, opposite below, the floral usually alternate. Flowers in terminal or axillary racemes, or solitary in leaf-axils, slightly zygomorphic. Calyx deeply divided into 4(-5) often unequal segments. Corolla rotate to campanulate; limb longer than tube, with 4 somewhat unequal lobes. Stamens 2. Fruit a loculicidal and sometimes also septicidal capsule, more or less flattened at right angles to the septum. Seeds usually numerous.

1. Flowers in axillary racemes (which if single and near the stem apex may appear terminal)
- Flowers in terminal racemes

2.
3.

2. Flowering stems procumbent or ascending; leaves all petiolate
Flowering stems more or less erect; upper leaves amplexicaul
 3. Flowers in racemes; stems usually more or less erect
Flowers solitary in leaf-axils; stems more or less procumbent
 4. Leaves 3- to 9-lobed; seeds more than 2 mm. in diameter
Leaves crenate or serrate; seeds less than 2 mm. in diameter
 5. Calyx segments cordate-ovate, acute; capsule glabrous
Calyx segments obovate, obtuse; capsule ciliate
 6. Capsule with sparse, long glandular hairs only; corolla usually whitish
Capsule with long glandular and shorter eglandular hairs; corolla blue
1. *beccabunga*
 2. *anagallis-aquatica*
 3. *arvensis*
 - 4.
 - 5.
 - 6.
 6. *hederifolia*
 7. *cymbalaria*
 4. *agrestis*
 5. *polita*

Sect. *Beccabunga* (Hill) Dumort.

1. *V. beccabunga* L. Brooklime

Glabrous perennial. Stems decumbent, rooting at the nodes. Leaves 10-40 mm. long, orbicular, ovate or oblong, obtuse, petiolate, subentire or shallowly crenate-serrate. Racemes up to 3 times as long as subtending leaves; bracts shorter than or about equalling pedicels. Calyx-segments subequal, more or less deflexed in fruit; corolla 5-7 mm. in diameter, pale to dark blue (rarely pink). Capsule 2-3 x 2-4 mm., subglobose, scarcely emarginate; style c. 2 mm. long. $2n = 18, 36$. Fl. 3-8.

Along stream. *Malta*: Ghajn il-Kbira (GD.; Borg).

Throughout most of Europe; N. Africa; Temperate Asia.

2. *V. anagallis-aquatica* L. Plate XII Blue Water-Speedwell
V. anagallis L.

Perennial (rarely annual). Stem (5-) 30-60(-100) cm. high, erect, simple or much branched at the base, glandular-pubescent or glabrous. Leaves 20-100 mm. long, light green; the lower ovate, often petiolate, subentire, the upper ovate-lanceolate, more or less amplexicaul, irregularly serrate near the apex. Racemes up to 3 times as long as subtending leaves, erect-patent or patent; pedicels 4-7 mm. long, erect, erecto-patent, or patent but distally erect. Calyx-segments erect in fruit, but not closely appressed to capsule; corolla 5-10 mm. in diameter, blue with violet veins. Capsule 2.5-4 x 2.5-3.5 mm., orbicular, ovate or elliptical; style 1.5-2 mm. long. $2n = 36$. Fl. 3-10.

Along winter-running streams. *Malta* and *Gozo*: locally frequent (G. Lanfranco; Wolseley), as at Ghajn Mula, Ghajn Rihana, Wied Qannotta, Gnejna, Wied il-Lunzjata (Borg); Chadwick Lakes; Wied Infitra (Haslam); Wied il-Hemsija (Gauci).

Almost throughout Europe; Asia; N.E. & S. Africa; N. & S. America; New Zealand.

Sect. *Pocilla* Dumort.

3. *V. arvensis* L.

Wall Speedwell

Annual. Stems (2-) 5-40 cm. high, simple to erect to much-branched and procumbent, pubescent and often slightly glandular. Leaves 2-15 mm. long, triangular-ovate with truncate or weakly cordate base, crenate-serrate, pubescent or subglabrous, the lower shortly petiolate, the upper sessile. Flowers in racemes; bracts longer than pedicels, the upper lanceolate, the lower ovate. Calyx-segments blue. Capsule c. 3 x 3 mm., obcordate, flat, ciliate, usually eglandular; style c. 1 mm. long, scarcely exceeding sinus. Seeds c. 1 x 0.75 mm., elliptical, flat. $2n = 114, 16$. Fl. 2-4.

Gardens, old walls, waste places. *Malta*: rather frequent (S. & C.G.; Borg; G. Lanfranco).

Almost throughout Europe; C. & W. Asia; N. Africa; Atlantic Islands.

4. *V. agrestis* L.

Green Field-Speedwell

Pubescent annual. Stems 5-30 cm. high, procumbent or decumbent. Leaves 5-15 mm. long, longer than wide, shortly petiolate, ovate with more or less truncate base, crenate or crenate-serrate, mostly alternate but the lowest opposite. Flowers solitary in leaf-axils; pedicels 5-15 mm. long, usually recurved in fruit. Calyx-segments 3-6 mm. long, ovate to ovate-lanceolate, subobtusate, not overlapping at base; corolla 3-6 mm. in diameter, usually whitish with blue upper petal. Capsule 3-4 x 4-6 mm., sparsely glandular-hirsute, bilobed with parallel lobes and deep, narrow sinus; style c. 1.5 mm. long, not exceeding sinus. Seeds c. 1.5 x 1.25 mm., broadly elliptical, on one face. $2n = 28$. Fl. 14.

Gardens and shady places, along country roads. *Malta*: frequent (S. & C.G.; Borg; G. Lanfranco).

Most of Europe; N. Africa; Asia Minor.

5. *V. polita* Fries

V. didyma Ten.

Gray Field-Speedwell

Differs from *V. agrestis* in leaves more regularly crenate-serrate, the lower often wider than long; calyx segments broadly ovate, often overlapping near base; corolla blue; capsule with long glandular hairs and short, crispate eglandular hairs; styles 2 mm. long, clearly exceeding the wide sinus. $2n = 14, 28$. Fl. 2-4.

Valleys. *Malta*: San Anton, Buskett, Ghajn il-Kbira, gardens at Attard, Lija, Birkirkara (Borg); Ta' Baldu (S. & C.G.).

Most of Europe; Temperate Asia; N. Africa.

6. *V. hederifolia* L.

Ivy-leaved Speedwell

Hairy annual. Stems 10-60 cm. long, procumbent. Leaves 5-15 mm. long, petiolate, suborbicular in outline, 3- to 5-lobed with large terminal lobe, mostly alternate but the lowest opposite. Flowers solitary in leaf-axil; pedicels not or scarcely exceeding leaves. Calyx segments 4-5 mm. long, cordate-ovate, acute, strongly ciliate; corolla 2-3 mm. in diameter, pale blue. Capsule c. 4 x 4 mm., subglobose, shallowly 4-lobed, glabrous; style c. 0.5 mm. long; seeds c. 2.5 x 2.25 mm., suborbicular, cup-shaped. $2n = 18, 28, 36, 54$. Fl. 12-3.

Walls and rocky ground. *Malta*: occasional (G. Lanfranco), as at Wied il-Ghasel, Mdina (S. & C.G.; Borg); Pietà, Wied Qirda (G.D. & Borg); Attard, Msida (Borg); Buskett (Kramer & Weston). *Gozo*: Mgarr ix-Xini (Borg); Qala, Rabat, by the bastions road (Gauci).

Most of Europe; Temperate Asia; N. Africa; Atlantic Islands.

7. *V. cymbalaria* Bodard

Pale Speedwell

Differs from *V. hederifolia* in leaves 5- to 9lobed, with subequal lobes; pedicels much exceeding leaves; calyx-segments 3-4 mm. long, obovate, obtuse; corolla 4-6 mm. long; capsule shallowly bilobed, ciliate; style c. 1.5 mm. long. $2n = 33, 54$. Fl. 12-5.

V. panormitana Tineo described from Sicily and Malta, differs in its smaller fruit and flower, and its subglabrous capsule. It may represent a distinct subspecies.

Rocky ground, walls and waste places. *Malta* and *Gozo*: frequent (S. & C.G.; Borg; G. Lanfranco).

Mediterranean region.

9. *Bellardia* All.

Annual, semiparasitic herbs. Leaves opposite, sessile, simple. Flowers zygomorphic, in terminal or axillary, bracteate, spike-like racemes, elongating in fruit. Calyx ventricose-campanulate. Corolla with a long tube and 2-lipped limb; lower lip longer than the upper, entire or emarginate, the lower 2-lobed. Stamens 4, didynamous; anthers hairy, mucronate at base. Stigma clavate. Capsule loculicidal; seeds c. 1 mm. in diameter, with several, narrowly winged longitudinal ribs and transversely striate between the ribs; hilum basal.

1. *B. trixago* (L.) All.

Plate XLII

Mediterranean Bartsia

Glandular-pubescent; stems 20-50 cm. high, usually simple, erect. Leaves 15-90 x 1-15 mm., linear to linear-lanceolate, obtuse to subacute, coarsely and obtusely serrate. Bracts like the leaves, decreasing in size upwards, the upper ovate, cordate, entire. Calyx 8-10 mm. long; teeth triangular, less than $\frac{1}{4}$ as long as tube. Corolla 20-25 mm. long, purple and white, rarely all white. Capsule subglobose. Fl. 4-5.

Waste ground and fallow fields. *Malta* and *Gozo*: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Comino*: common (S. & C.G.; Borg).

Mediterranean region; W. Asia; Atlantic Islands; S. America.

10. *Parentucellia* Viv.

Annual, hemiparasitic herbs. Leaves opposite, sessile, simple. Flowers zygomorphic, in terminal or axillary, bracteate, spike-like racemes, elongating in fruit. Calyx tubular, 4-lobed. Corolla with a long tube, lower lip longer than upper; entire or emarginate, the lower 3-lobed. Stamens 4, didynamous; anthers hairy, mucronate at base. Stigma capitate. Capsule loculicidal; seeds c. 0.5 mm., smooth; hilum broad.

1. *P. viscosa* (L.) Caruel
Bartsia viscosa L.

Plate XLII

Yellow Bartsia

Erect glandular-hairy annual; stems 10-50 cm. high, usually simple. Leaves 10-30 x 3-15 mm., oblong to lanceolate, acute to subacute, coarsely serrate. Bracts like the leaves, but decreasing in size upwards. Calyx 10-16 mm. long; teeth linear-lanceolate, nearly as long as tube. Corolla 10-24 mm. long, pubescent, yellow, caducous. Capsule 7-9 mm. long, pubescent. $2n = 48$. Fl. 3-5.

Abandoned fields and uncultivated places in country areas. *Malta*: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Gozo*: Ghajnsielem, Mgarr ix-Xini (Borg).

S. & W. Europe, north to S.W. Scotland; Mediterranean region; Azores, Canaries.

LXXXV. ACANTHACEAE

Differs from *Scrophulariaceae* chiefly in the hardened and toughened funicle, which often develops into a 'jaculator' for ejecting the seeds, and almost always in the absence of endosperm. In addition the leaves are always opposite, coloured bracts are often present, the corolla is strongly zygomorphic, the stamens often unequally 1-locular or only 1-locular and the style unequally bilobed.

Basal leaves pinnatifid

Leaves all entire

1. *Acanthus*

2. *Justicia*

1. *Acanthus* L.

Robust perennial herbs or small shrubs. Stems single, terete, erect, unbranched. Leaves mostly basal, pinnatifid to pinnatisect. Stipules absent. Flowers in dense terminal cylindrical spikes. Bracts large, spinose-dentate; bracteoles entire, lanceolate to linear. Calyx 4-lobed, with large upper and lower lips and small lateral lobes. Corolla 1-lipped (upper lip absent), 3-lobed; tube short. Stamens 4, included; anthers 1-celled, connate in pairs. Fruit a septicidal capsule.

1. *A. mollis* L.

Plate XLII

Hannevija, Brankorsina

A. spinulosus Host

Common Bear's Breech

Stems 30-80 cm. high. Leaves glabrous to puberulent; basal c. 30 x 15 cm., oblong-ovate, pinnatifid, the lobes not narrowed at the base, incise-dentate, long-petiolate; cauline 1-3 cm. long, few, more or less ovate, spinose-dentate, more or less sessile. Bracts c. 4 cm. long, ovate, glabrous. Calyx 4-5 cm. long, glabrous. Corolla 4-5 cm. long, whitish with purple veins. $2n = 36$. Fl. 3-6.

Sheltered rocky ground. *Malta* and *Gozo*: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region.

2. *Justicia* L.

Woody shrub. Stems much branched. Leaves entire. Stipules absent. Flowers in dense cymose panicles. Bracts and bracteoles large, often overlapping the calyces, oblong or linear, patent. Calyx campanulate, deeply 5-toothed, the two anterior teeth coherent. Corolla tube short, limb long, 2-lipped, upper lip helmet-like subentire, lower lip patent-recurved, 3-lobed, with larger middle lobe and convex palate. Stamens 2, not exerted; anthers 2-celled. Fruit a 2-celled capsule.

LXXXVI. OROBANCHACEAE

M. alba: frequently planted as a roadside shrub as at Fleur-de-Lys, Floriana, Rabat and Argotti, and also in gardens (Wolseley).
Native of Tropical Asia; naturalised in Sicily.

Native of Tropical Asia; naturalised in Sicily.

LXXXVI. OROBANCHACEAE

Perennial (rarely annual) herbs without chlorophyll, parasitic on the roots of other phanerogamic plants (usually herbaceous dicotyledons). Stems erect, usually simple. Leaves alternate, scale-like, often succulent at first. Flowers in a terminal spike or raceme, rarely in a panicle or solitary. Calyx tubular, cup-shaped or 2-lipped. Corolla 5-lobed, 2-lipped or almost regular. Stamens 4, didynamous. Ovary superior, 1-locular; placentae 2-4, parietal, often deeply lobed placentae; style single; stigma more or less 2-lobed. Fruit a loculicidal capsule; seeds small, numerous, embryo minute.

1. *Orobanche* L.

Perennial, biennial or annual. Stems stout or slender, simple or branched. Leaves numerous. Flowers in usually dense spikes or racemes. Bracteoles, if present, adnate to calyx. Calyx with cylindrical to campanulate tube and 4(-5) teeth, or divided, usually deeply, into 2 lateral segments, which may be entire or bifid. Corolla strongly 2-lipped; lower lip 3-lobed, at least as long as the upper. Stamens included, Placentae 4, variably lobed. For most species there is no reliable information as to annual or perennial habit.

- | | |
|---|--------------------|
| 1. Each flower subtended by 2 bracteoles (more or less adnate to calyx), as well as by a bract | 2. |
| Bracteoles absent | 4. |
| 2. Anthers glabrous | 1. ramosa |
| Anthers more or less densely hairy | 3. |
| 3. Calyx-teeth not more than 1½ times as long as the tube | 2. javanulacea |
| Calyx-teeth 2-3 times as long as the tube | 3. schultzei |
| 4. Stigma purple or dark red at anthesis | 5. |
| Stigma yellow, orange or white (rarely pink) at anthesis | 9. |
| 5. Lower lip of corolla glandular-ciliate | 13. caryophyllacea |
| Lower lip of corolla not ciliate | 6. |
| 6. Corolla shining dark red inside, mostly dark red or purple outside | 14. sanguinea |
| Corolla not shining dark red inside, usually white or pale yellow outside at least towards the base | 7. |
| 7. Corolla villous | 6. pubescens |
| Corolla glabrous or glandular-pubescent | 8. |

- | | |
|---|----------------|
| 8. Bracts 10-20 mm. long; filaments inserted 3-5 mm. above base of corolla | 9. loricata |
| Bracts 7-15 mm. long; filaments inserted 2-3 mm. above base of corolla | 10. minor |
| 9. Corolla-tube narrowed to the mouth; on <i>Hedera</i> | 12. hederac |
| Corolla-tube cylindrical or campanulate, or constricted some distance below the mouth | 10. |
| 10. Corolla becoming conspicuously inflated, scarious and shining at base | 4. cernua |
| Corolla not as above | 11. |
| 11. Corolla 20-30 mm. long | 5. crenata |
| Corolla 10-18 mm. long | 12. |
| 12. Filaments with wide more or less deltate base; spike not more than 3 times as long as wide | 7. densiflora |
| Filaments gradually and only slightly widened towards the base; spike 4-8 times as long as wide | 13. |
| 13. Stigma yellow | 8. canescens |
| Stigma orange to purple | 11. clausonius |

Sect. *Trionychon* Wallr. Stems simple or branched. Flowers pedicellate or sessile. 2 bracteoles present, adnate to calyx. Calyx with cylindrical to campanulate tube and 4 subequal teeth, rarely with a fifth, much smaller tooth. Corolla white, cream, blue or violet, constricted below the middle near the insertion of the filaments; upper lip 2-lobed.

1. *O. ramosa* L.

Budebbus qasir
Hemp Broomrape

Stems 5-30 (-40) x 0.15-0.4 (0.6) cm. high, swollen at the base, simple or branched, glandular-pubescent. Leaves 3-8 (-10) mm. long, ovate to ovate-lanceolate, acute. Inflorescence 2-25 cm. long, lax or dense, glandular-pubescent; bracts 6-8 (-10) mm. long, ovate-lanceolate; bracteoles linear-lanceolate, about equalling calyx; pedicels 1.5 (-8) mm. long. Calyx 6-8 mm. long. Corolla 10-22 mm. long, glandular-pubescent, suberect and inflated at base, erect-patent and tubular-infundibuliform distally, whitish at base, cream, blue or violet distally, rarely white throughout; lower lip somewhat deflexed, with suborbicular to elliptical, entire or denticulate lobes. Filaments glabrous, or hairy at the base, inserted 3-6 mm. above base of corolla; anthers glabrous, or sparsely hairy at the base. Stigma white, cream or pale blue. Capsule 6-7 (-10) mm. in diameter, $2n = 24$. Fl. 4-5.

Three subspecies are recorded. Subsp. *muteli* (F.W. Schultz) Coutinho (Kopsia *muteli* (F.W. Schultz) Béguinot) with the corolla (15-)18-22 mm. long; and subsp. *ramosa* (Kopsia *ramosa* (L.) Dumort.) and subsp. *nana* (Reuter) Coutinho (Kopsia *muteli* var. *melitensis* G. Beck) with the corolla 10-15(-17) mm. long, subsp. *ramosa* having the corolla whitish to blue or lilac and calyx teeth acuminate, shorter from the tube; and subsp. *nana* with a yellow corolla and calyx teeth filiform-subulate as long as the tube.

On a wide variety of hosts in arid places, *Malta*, *Gozo* and *Comino*: common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region; W. & C. Asia; Ethiopia.

O. lavendulacea Reichenb.

Kopsia lavendulacea (Reichenb.) Caruel

Budebbus vjola

Lavender Broomrape

Stems 15-60 x 0.4-0.7 cm., swollen at base, simple or branched, glandular-pubescent. Leaves 7-12 mm. long, ovate-lanceolate, acuminate. Inflorescence (6-)12-30 cm. high, lax or dense, glandular-hairy; bracts 7-10(-15) mm. long, ovate-lanceolate, slightly shorter than calyx. Calyx 6-8 mm. long, usually blue; teeth equalling or slightly longer than tube, triangular with subulate apex. Corolla 16-22 mm. long, glandular-hairy, suberect at base, patent and narrowly campanulate distally with strongly divergent lips, white at base, bright blue distally; lobes of lower lip suborbicular, denticulate. Filaments glabrous or sparsely hairy, inserted c. 6 mm. above base of corolla; anthers hairy. Stigma white or yellowish. Capsule 6-7 mm. in diameter. Fl. 4-5.

On a variety of hosts; most commonly *Psoralea bituminosa*. Malta: occasional (S. & C.G.); St. Paul's Bay, Bugibba, Salini, Mellieha, Mtahleb, Gnejna, Wied Incita, Buskett, Dingli (Borg); Wied Babu (GD). Gozo: Klendi, Mgarr ix-Xini (S. & C.G.; Borg); Pergla (Borg), Munxan (Kramer & Westra).

Mediterranean region; Atlantic Islands.

3. *O. shultzei* Mutel

Kopsia shultzei (Mutel) Beguinot

Blue Broomrape

Stems 10-60 x 0.4-0.8 cm., swollen at base, simple or branched, glandular-pubescent. Leaves 5-10 mm. long, numerous, ovate to lanceolate. Spike 7 x 3-4 cm., dense above, lax below, glandular-hairy; bracts 8-12 mm. long, lanceolate; bracteoles linear-lanceolate, slightly shorter than calyx; most of the flowers shortly pedicellate. Calyx 8-12 mm. long; teeth 2-3 times as long as the tube, linear-lanceolate with subulate apex. Corolla 16-21 mm. long, glandular hairy, erecto-patent, tubular to narrowly campanulate, nearly straight, white at base, blue to violet distally; lobes of lower lip elliptical, acute to acuminate. Filaments glabrous or subglabrous, inserted 4-5 mm. above base of corolla; anthers hairy. Stigma white. Capsule 7-8 mm. in diameter. Fl. 3-5.

On the roots of *Inula viscosa* and *Vicia faba*. Malta: Wied Balluta (GD; Borg); Maghtab (Borg).

Mediterranean region.

Sect. *Orobanche* (*Osproleon* Walbr.) Stems simple. Flowers sessile, without bracteoles. Calyx split above and below almost or completely to the base, and thus divided into 2 lateral segments, which may be entire or equally or unequally bifid. Corolla variously shaped, usually tinged with yellow, brown or red; upper lip 2-lobed to entire.

4. *O. cernua* Loeff.

Drooping Broomrape

Stems up to 40 cm. high, only slightly swollen at base, more or less glandular-pubescent, yellowish. Leaves 5-10 mm. long, ovate-lanceolate. Spike up to 25 x 2.5-4 cm., usually dense, glandular-puberulent, brown, variably tinged with blue; bracts 7-12 mm. long, ovate or lanceolate. Calyx 7-12 mm. long; segments free, more or less bidentate. Corolla 12-20 mm. long, sparsely glandular-puberulent, more or less bidentate. Corolla 12-20 mm. long, sparsely glandular-puberulent, suberect, inflated and whitish-scarious, conspicuously at base, constricted and inflexed near middle, the distal part patent or somewhat deflexed, violet-blue, sparsely pubescent; lobes of lower lip subequal, not ciliate. Filaments glabrous or subglabrous, inserted 4-6 mm. above base of corolla; anthers glabrous. Stigma whitish. Capsule 8-10 mm. long. Fl. 4-5.

On *Compositae* and *Solanaceae*, rarely on other herbs Malta: rare, Marfa (S. & C.G.; Borg); Mellieha, Buskett, gardens at Sa Maison (Borg). Gozo: Marsalforn (S. & C.G.; Borg).

Mediterranean region; W. & C. Asia; Australia.

5. *O. crenata* Forskal

Plate XLII

Budebbus tufful

Bean Broomrape

Stems up to 50(-30) x 12 cm., slightly swollen at the base, sparsely villous, usually yellowish. Leaves 12-25 mm. long, linear-lanceolate, dense below, sparse above. Spike up to 20(-50) x 4 cm., dense above, often lax below, villous; bracts 15-25; linear to ovate-lanceolate, long-acuminate; flowers fragrant. Calyx 10-20 mm. long; segments free, more or less bidentate. Corolla 20-30 mm. long, subglabrous, white, sometimes tinged with lilac distally, erecto-patent, straight or slightly curved, campanulate; lips divergent, the lower with large, suborbicular lobes, not ciliate. Filaments hairy, inserted 2-4 mm. above base of corolla; anthers glabrous. Stigma white, yellow or pinkish. Capsule 10-12 mm. in diameter. Fl. 3-5.

Usually on leguminous crop-plants. Malta and Gozo: very common, often damaging a whole field of *Vicia faba* (fuf) (S. & C.G.; Borg; Wolsley). Comino: (Borg; G. Lanfranco; Wolsley).

Mediterranean region; W. Asia.

6. *O. pubescens* D'Urv.

O. versicolor F.W. Schultz

Budebbus muswat

Hairy Broomrape

Stems 15-50 x 0.4-0.7 cm., variably swollen at base, glandular-pubescent, pale yellow, often tinged with pink. Leaves 10-25 mm. long, oblong to linear-lanceolate. Spike 7-22 x 2-4 cm., rather lax, acuminate; calyx 8-16 mm. long, segments free or almost free, usually equally bifid. Corolla 10-20 mm. long, villous, pale yellow, tinged with violet above, erecto-patent, tubular, more or less uniformly curved; upper lip more or less entire; lower lip not or sparsely ciliate, the middle lobe the larger. Filaments hairy below, usually glabrous above, inserted 3-4 mm. above base of corolla; anthers glabrous. Stigma violet. Capsule 8-10 mm. in diameter. Fl. 4-5.

On *Compositae* and *Umbelliferae*, perhaps also on *Leguminosae*. Malta: frequent at Wied Qirda, St. Paul's Bay, Ta' Baldu, Wied Babu (S. & C.G.; Borg); Floriana (Borg); Maghtab (Gauci & E. Lanfranco); Hal Bajjada (Rabat) (Wolsley). Gozo: Mgarr ix-Xini (S. & C.G.; Borg); Nadur (Borg). Comino: (S. & C.G.).

S.E. Europe extending locally westwards to S.E. France; S.W. Asia.

7. *O. densiflora* Salzm. ex Reuter

Dense-flowered Broomrape

Stems 15-40 x 0.6-0.8 cm., more or less strongly swollen at base, glandular-pubescent but more or less glabrescent below, ? reddish. Leaves 20-30 mm. long, oblong-lanceolate, acute. Spike 5-10 x 3-3.5 cm., dense, glandular-pubescent to more or less villous; bracts 15-20 mm. long, lanceolate, acuminate. Calyx 7-12 mm. long; segments free or shortly connate at base, unequally bifid. Corolla 10-18 mm. long, glandular-puberulent to subglabrous, yellowish, erecto-patent to more or less patent, tubular, slightly curved; upper lip emarginate to 2-lobed; lobes of lower lip subequal, not ciliate. Filaments sparsely hairy below, more or less glabrous above, inserted 1.5-4 mm. above base of corolla, with wide, more or less deltate base; anthers glabrous. Stigma yellow. Capsule 8-9 mm. in diameter.

On *Lotus hisophilus*. Malta: rare on sandy sea shore at Marfa, Ghadira (S. & C.G.; Borg).

S. Portugal; S.W. Spain; Morocco.

8. *O. canescens* C. Presl

Yellow Broomrape

Stems 10-70 (-100) x 0.3-1 cm., variably swollen at base, glandular-pubescent to villous, yellowish, more or less tinged with purple, red or brown. Leaves 10-25 mm. long, ovate. Spike 3-30 x 2-4 cm., usually lax below, more or less dense above, glandular-pubescent; bracts 10-20 mm. long, lanceolate, acuminate. Calyx 8-16 mm. long; segments usually unequally bifid. Corolla 12-18 mm. long, glandular-pubescent to subglabrous, yellow tinged with red; upper lip emarginate or 2-lobed; lower lip with subequal lobes. Filaments inserted 3-4.5 mm. above base of corolla, hairy below (sometimes sparsely), subglabrous above; anthers glabrous. Stigma yellow. Capsule 8-10 mm. Fl. 3-5.

On *Compositae*. Malta: old cemeteries at Floriana according to Delicata (Borg). C. and E. parts of Mediterranean region.

9. *O. loricata* Reichenb.

Ox-tongue Broomrape

O. picridis F.W. Schultz ex Koch

Stems 10-70 (-100) x 0.3-1 cm., variably swollen at base, glandular-pubescent to villous, yellowish, more or less tinged with purple, red or brown. Leaves 10-25 mm. long, narrowly lanceolate. Spike 3-30 x 2-4 cm., usually lax below, more or less dense above, glandular-pubescent; bracts 12-20 mm. long, lanceolate, acuminate. Calyx 10-15 mm. long; segments unequally bifid, rarely entire. Corolla 14-22 mm. long, glandular-pubescent or puberulent or subglabrous, white or pale yellow, tinged and veined with violet; upper lip emarginate to bifid; lobes of the lower lip subequal or the middle larger. Filaments inserted 3-5 mm. above base of corolla. Stigma purple. Capsule 8-10 mm. in diameter. $2n = c. 38$. Fl. 4-5.

On *Leguminosae*, *Umbelliferae* and *Compositae*. Malta: frequent (S. & C.G.; Borg). Gozo: (Borg). Comino: (S. & C.G.; Borg).

S., W. and C. Europe, extending to Denmark, N. Africa and Palestine.

10. *O. minor* Sm.

Common Broomrape

O. barbata sensu Borg

Stems 10-70 (-100) x 0.3-1 cm., variably swollen at base, glandular-pubescent to villous, yellowish, more or less tinged with purple, red or brown. Leaves 10-25 mm. long, ovate to linear-lanceolate. Spike 3-30 x 2-4 cm., usually lax below, more or less dense above, glandular-pubescent; bracts 7-15 mm. long, lanceolate, acuminate. Calyx 7-12 mm. long; segments equally or unequally bifid, rarely entire, free. Corolla 10-18 mm. long, erecto-patent to more or less patent, tubular or narrowly campanulate, curved or nearly straight, glandular-pubescent or subglabrous, pale yellow, usually tinged with dull violet distally; upper lip emarginate to 2-lobed; lower lip with subequal lobes or the middle the largest, not ciliate. Filaments inserted 2-3 mm. above base of corolla, hairy below, subglabrous above; anthers glabrous. Stigma purple, rarely yellow. Capsule 8-10 mm. long. $2n = 38$. Fl. 3-4.

Parasitic mostly on *Leguminosae* and *Compositae*. Malta: infrequent (Borg; G. Lanfranco). Gozo: more frequent as at Ta' Cent, Mgarr ix-Xini, Sannat, Xlendi, Xaghra (Borg).

W., S. & S.C. Europe; S.W. Asia; N. Africa; Atlantic Islands.

11. *O. clausonis* Pomel

Glandular Broomrape

Stems 15-40 x 0.3-0.5 cm., slightly swollen at base, glandular-pubescent, yellowish. Leaves 5-15 mm. long, ovate to lanceolate, acute. Spike dense, becoming more or less lax, glandular-pubescent; bracts 8-15 mm. long, ovate to lanceolate, acuminate. Calyx 5-8 mm. long; segments connate for about half their length, equally bifid with broadly triangular, acute teeth. Corolla (10-) 15-17 mm. long, glandular-pubescent, yellow, erecto-patent, somewhat curved, the upper lip more or less entire, the lobes of the lower lip subequal, not ciliate. Filaments sparsely hairy below, glabrous above, inserted (1-) 3 mm. above base of corolla. Anthers glabrous. Stigma orange to purple. Fl. 4-5.

On *Rubiaceae*. Malta: collected once at St. Paul's Bay (S. & C.G.; Borg).

Spain; Portugal; Malta; Algeria.

12. *O. hederac* Duby

Ivy Broomrape

Stems 15-60 x 0.3-0.8 cm., usually strongly swollen at base, glandular-pubescent, yellow to reddish-purple. Leaves 12-30 mm. long, oblong to lanceolate, acute. Spike 10-40 x 2.5-4 cm., lax, glandular-pubescent; bracts 12-22 mm. long, lanceolate, acuminate. Calyx 10-15 mm. long; segments free, entire or unequally bifid. Corolla 10-22 mm. long, subglabrous, rarely glandular-pubescent, dull cream, tinged distally with reddish-purple, erecto-patent, to more or less patent; tube somewhat inflated below, gradually narrowed to the mouth, nearly straight; lips patent, the upper entire to emarginate, the lower not ciliate; with middle lobe usually the larger. Filaments more or less glabrous, rarely somewhat hairy below, inserted 3-4 mm. above base of corolla; anthers glabrous. Stigma yellow. Capsule 10-12 mm. in diameter. $2n = 38$. Fl. 3-6.

On *Hedera helix*. Malta: in the ditches of Valletta and Floriana, San Anton, Buskett, Ta' Baldu (Borg); Addolorata and Ta' Braxia cemetery (Borg; G. Lanfranco). Gozo: rare at Mgarr (Borg).

Mediterranean region, northwards to Iceland.

13. *O. caryophyllacea* Sm.

Bedstraw Broomrape

Stems 15-50 x 0.4-0.8 cm., slightly swollen at base, glandular-hairy, yellowish or purplish. Leaves 15-30 mm. long, narrowly triangular-lanceolate, acute. Spike 6-20 x 2.5-4 cm., usually lax, glandular-pubescent, pink or pale yellow, variously tinged with dull purple, erecto-patent, narrowly campanulate, uniformly curved; upper lip emarginate; lower lip with subequal, glandular-ciliate lobes. Filaments hairy, inserted 1-3 (-5) mm. above base of corolla; anthers glabrous. Stigma purple. Corolla 9-12 mm. in diameter. $2n = 38$. Fl. 4-6.

Malta: at San Anton according to Gulia (Borg).

Europe northwards to the Netherlands and S.C. Russia.

14. *O. sanguinea* C. Presl

Bloody Broomrape

O. crinita Viv.

Stems 10-40 x 0.3-0.7 cm., swollen at base, glandular-pubescent, yellow or purplish-red. Leaves 12-35 mm. long, narrowly lanceolate to linear-oblong, dense, especially below. Spike 5-15 x c. 2.5 cm., glandular-pubescent, dense; bracts 8-15 mm. long, triangular-lanceolate, acuminate; flowers scentless. Calyx 7-10 mm. long;

segments shortly connate at base, unequally bilobed. Leaves 2.5-5 x 1.2-5 cm., obovate, dark green above, obtuse and mucronate at apex, serrate in distal half. Flowers in dense (1-) 5- to 9-flowered cymes; pedicels up to 10 mm. long, slender. Calyx 2-3 mm. long, divided into lanceolate lobes. Corolla white, with small purple spots; tube 4-5 mm. long; limb 10-12 mm. in diameter. Stamens 5. Fruit 1-6 mm. long; limb 10-12 mm. in diameter. Stamens 5. Fruit 4-6 mm. long, globose. Fl. 4-6.

Parasitic on *Leguminosae*. Malta and Gozo: very rare Marfa; Mellieha (Borg); Ghadira (E. Lanfranco).

South Europe and Algeria.

LXXXVII. MYOPORACEAE

Shrubs or small trees. Leaves simple, entire, exstipulate. Flowers hermaphrodite, 5-merous. Calyx deeply lobed. Corolla with a short tube and weakly zygomorphic limb. Stamens 4-5, inserted on the corolla-tube and alternating with the lobes. Ovary superior, 2 to 10 locular; style filiform; ovules usually 1 or 2 in each loculus. Fruit a drupe.

1. *Myoporum* Solander ex G. Forster

Evergreen trees or shrubs. Leaves alternate, rarely opposite, entire or serrate, with numerous pellucid glands. Flowers small, axillary, solitary or clustered in cymes. Calyx 5-lobed. Corolla campanulate-hypocrateriform with a short tube and 5 patent lobes, often bearded. Stigma obtuse. Fruit a scarcely fleshy drupe.

1. *M. tetrandrum* (Labill.) Domin

Toothed *Myoporum*

M. serratum R.Br.

Shrub up to 8 m. high; bark brownish-grey, minutely fissured. Leaves 2.5-5 x 1-2.5 cm., obovate, dark green above, obtuse and mucronate at apex, serrate in distal half. Flowers in dense (1-) 5- to 9-flowered cymes; pedicels up to 10 mm. long, slender. Calyx 2-3 mm. long, divided into lanceolate lobes. Corolla white, with small purple spots; tube 4-5 mm. long; limb 10-12 mm. in diameter. Stamens 5. Fruit 4-6 mm. long, globose. Fl. 4-6.

Malta and Gozo: planted for ornament along roads and sometimes found naturalised (Borg).

Native of Australia and Tasmania.

PLANTAGINALES

LXXXVIII. PLANTAGINACEAE

Annual to perennial herbs. Leaves usually in basal rosettes, sometimes opposite or alternate, exstipulate. Flower (2-) 4-numerous, actinomorphic, hermaphrodite or sometimes unisexual, bracteate, usually in spikes. Sepals connate at base, persistent. Corolla gamopetalous, scarious. Filaments long; anthers conspicuous. Ovary superior, 1 to 4-locular; style 1; ovules 1- to many, axile or basal. Fruit a circumscissile capsule or indehiscent; seed endospermic, with straight embryo, often mucilaginous when wet.

1. *Plantago* L.

Terrestrial annuals, biennials or perennials. Leaves in basal rosettes, or opposite or alternate on branched stems. Flowers 4-merous, in spikes on distinct peduncles.

mostly hermaphrodite. Corolla-lobes usually patent or deflexed. Stamens inserted on corolla-tube. Ovary 2- to 4-locular; ovules 2- many. Capsule circumscissile.

- | | | |
|--|----------------------|----|
| 1. Stems long; leaves opposite | 9. <i>afra</i> | 2. |
| Stems short, leaves alternate, forming a radical rosette | | |
| 2. Corolla tube glabrous | | 3. |
| 2. Corolla tube hairy | | 7. |
| 3. Seeds numerous | 1. <i>major</i> | 4. |
| Seeds 2 | | |
| 4. Scapes sulcate | | 5. |
| Scapes terete | | 6. |
| 5. Perennial with branched stock | 5. <i>lanceolata</i> | |
| Annual with simple stock | 6. <i>lagopus</i> | |
| 6. Perennials with branched stock | 7. <i>albicans</i> | |
| Annual with simple stock (sometimes with several rosettes) | 8. <i>bellardi</i> | |
| 7. Leaf axils more or less glabrous | 4. <i>serraria</i> | 8. |
| Leaf axils densely villous | | |
| 8. Leaves with prominent median veins on the lower surface | 2. <i>coronopus</i> | |
| Leaves without prominent median veins | 3. <i>macrorhiza</i> | |

Subgen. *Plantago*

Leaves in basal rosettes or alternate.

1. *P. major* L.

Bibbula kbira

Greater Plantain

Perennial with one or few rosettes. Leaves (1.5-) 5-30 (-40) x (0.5-) 3-10 (-15) cm., lamina ovate or elliptical, distinctly 3- to 9-veined, obtuse, entire or irregularly dentate, glabrous or puberulent; petiole up to as long as lamina. Scapes usually several, (3-) 10-50 (-70) cm. long, equalling or exceeding leaves, erect or ascending, terete, with appressed or erecto-patent hairs; spikes about as long as or shorter than the rest of scape, usually dense. Bracts 1-2 mm. long, ovate, glabrous, green, with narrow scarious margin. Sepals 1.5-2.5 mm. long, exceeding bracts, obovate to ovate-elliptical, obtuse, green, with keeled mid-vein and scarious margin. Corolla-tube c. 2 mm. long, glabrous, persistent until fruiting; lobes c. 1 mm. long, lanceolate to ovate, subobtusate, glabrous, yellowish-white. Stamens 4-5 mm. long, exerted 2-3 mm., anthers pale lilac, becoming yellowish. Capsule 2-4 mm. long, subglobose to conical; seeds (4-) 6-34, 1-1.5 mm. long, ellipsoid-trigonal, blackish-brown, weakly rugose. Fl. 3-11.

Two subspecies occur. Subsp. *major* has the leaves with 5-9 veins and seeds (4-) 8-10 (-13). Subsp. *intermedia* (Godron) Arcangeli (var. *paludosa* Ledch.) has the leaves with 3-5 veins and seeds 14-34.

Damp, shady valley bottoms. Malta: local (G. Lanfranco), as at Buskett, Mtahleb (S. & C.G.; Borg; Wolseley); Wied Gerżuma, Girdenti, Gnejna, (S. & C.G.; Borg); Bahrija, Gnien Ingraw, San Anton (Borg). Gozo: Xlendi, il-Lunzjata (S. & C.G.; Borg); Mgarr ix-Xini (Borg; Wolseley).

Europe; N. and C. Asia; naturalised throughout most of the world.

2. *P. coronopus* L.

Salib I-art
Buck's-horn Plantain

Annual, biennial or perennial with one or few rosettes. Leaves 3.20 x 0.5-2 cm., numerous, all basal, linear to lanceolate in outline, dentate to 1- to 2-pinnatifid, occasionally entire, glabrous to sparsely pubescent, sessile, sheathing at base; densely tomentose in leaf axils. Scapes numerous, 0.5-4 cm. high, arcuate-ascending or decumbent, shorter than or exceeding leaves, terete, more or less appressed-hairy. Spikes 1.5 x 0.3-0.5 cm., cylindrical, dense. Bracts 2.5-3 mm. long, not or scarcely exceeding the calyx, ovate, often long acuminate, sometimes obtuse and appressed, occasionally with spreading points, keeled with broad scarious lamina and stiffly ciliate margins. Sepals unequal, posterior 2 broadly ovate-obtuse, connate at least at base, with mid-vein keeled and green and scarious margins broad, colourless and with rigid cilia. Corolla tube c. 2 mm. long, pubescent, lobes c. 1 mm. long, ovate, acute or acuminate, without a midrib, brownish. Stamens pale yellow. Capsule c. 4 mm. long, 3-locular. Seeds 3-6, c. 1 mm.

Two subspecies occur. Subsp. *coronopus* has the scapes exceeding the leaves and bracts abruptly attenuate into a long apex. $2n = 10$. Subsp. *connatata* (Guss.) Pilger has the scape shorter than or equalling the leaves and the bracts ovate and more or less acute. $2n = 20$.

Malta, Gozo and Comino: very common (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Cominotto*: (Duthie Borg).

Coasts of Europe from Mediterranean to S. Sweden; N. Africa; W. Asia; Atlantic Islands; introduced in N. America, Australia, New Zealand.

3. *P. macrorhiza* Poiret

Perennial Buck's-horn Plantain

P. coronopus var. *macrorhiza* (Poiret) Fiori
var. *ceratophylla* (Hoffmans & Link) Fiori

Differs from *P. coronopus* in being perennial with woody rhizomes, often shortly branched; tufted; leaves thick, rigid, oblong-spathulate to linear, with dentate margins as in *P. coronopus*, median vein not apparent; scape plus spike equalling or slightly longer than leaves; spikes 2.5-7 cm. long, usually narrowly-conical; bracts c. 4 mm. long, setaceous-acuminate, with spreading points. $2n = 30$. Fl. 3-10.

Arid places, valleys and country roadsides. *Malta*: rather rare at Marfa, Salini, Bahar i-Caghaq (Borg).

C. & W. Mediterranean region.

4. *P. serraria* L.

Plate XLII

Bizbula
Toothed Plantain

Robust perennial with one or few rosettes. Stems short and thick. Leaves numerous, 8.15 x 0.6-1.5 cm., lanceolate, acute, regularly serrate, with 8-13 subulate-lanceolate teeth on both sides, diminishing towards apex of leaf; glabrous to pubescent, veins 3, conspicuous, base broad and sheathing. Scapes numerous c. 5-18 cm. long, equalling or exceeding leaves, arcuate-ascending to decumbent, terete, more or less hairy. Spike (5-)6-10 x 0.3-0.4 cm., narrowly cylindrical, dense. Bracts 2.5-3 mm. long, shorter than calyx, ovate, obtuse to subacute, with narrow keel and thick, rigidly ciliate, scarious margins. Sepals unequal, dorsally more or less hairy; posterior 3.5 mm. long, cymbiform with winged concave keel and more or less equal scarious margins; anterior sepals 3 mm. long, almost flat, with wide, thick, keel and scarious, unequal margins. Corolla tube 4 mm. long, narrow below, shortly villous; lobes 1.25-1.5 mm. long, narrow to widely ovate-acute. Seeds 2-4, 1-1.5 mm. $2n = 10$. Fl. 3-5.

Valleys and waste-places. *Malta, Gozo and Comino*: common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region.

5. *P. lanceolata* L.

Bizbula salvagga
Ribwort Plantain

Perennial with several rosettes; lateral roots up to 0.75 mm. thick. Leaves 2-30 x 0.5-3.5 cm., usually linear lanceolate to lanceolate, acute, 3- to 5- (to 7-) veined, entire or remotely and shallowly dentate, subglabrous, more or less appressed-pubescent, or villous with white hairs, sessile or gradually narrowed into a petiole up to as long as the lamina, usually sheathing at base and white tomentose-villous in axils. Scapes 5-70 cm. long, about twice as long as leaves, several or many, erect, ascending or decumbent, strongly 5-sulcate, more or less appressed-hairy; spikes 0.5-5 (-8) cm. long, globose to cylindrical, very dense. Bracts 2.5-3.5 mm., not or scarcely exceeding calyx, ovate, more or less acuminate, brown, glabrous or shortly hairy, keeled with scarious margins. Sepals 2.5-3 mm. long, ovate, obtuse or apiculate, greenish or brown with wide scarious margins, usually ciliate above, with prominent often shortly hairy keel; anterior sepals connate for most of their length but their midrib separate. Corolla-tube 2-3 mm. long, glabrous; lobes 1.5-2.5 mm. long, lanceolate to ovate, acute or acuminate, brownish, glabrous. Stamens 5-8 mm. long, lanceolate to ovate, acute or acuminate, brownish, glabrous; ovate-ellipsoid; seeds 2, c. 2 mm. long, oblong, concave-convex, blackish, smooth, shiny. $2n = 12$. Fl. 3-5.

Valleys and humid places. *Malta*: locally common (G. Lanfranco), as at Mtaħleb, Buskett (S. & C.G.; Borg; Wolseley); Fiddien, Gnejna (S. & C.G.; Borg); Pietà, Bahrija (Borg). *Gozo*: Wied il-Lunzjata (Borg).

Europe; N. and C. Asia; introduced in most other temperate countries, less frequent in the tropics.

6. *P. lagopus* L.

Bizbula
Mediterranean Plantain

Differs from *P. lanceolata* in plant being annual, with one rosette, sometimes with stem up to 10 (-20) cm. high; leaves usually remotely dentate, subglabrous to villous with yellowish hairs, densely villous in axils; scapes finely sulcate (stratite); bracts ovate-lanceolate, acute, together with the sepals densely villous in apical half with hairs protruding beyond apex so that whole inflorescence appears villous; corolla-lobes long-acuminate, usually sparsely hairy; capsule c. 2.5 mm. long; seeds c. 1.5 mm. in diameter, brown. $2n = 12$. Fl. 2-5.

Cultivated and waste places. *Malta, Gozo and Comino*: very common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region; Atlantic Islands.

7. *P. albicans* L.

Downy Plantain

Subcaespitose perennial with branches 1-7 cm. high, densely covered with leaf bases and terminal rosettes. Leaves in rosettes at apex of branches, (2-)5-15 x (0.2-)0.5-0.8 (-1.3) cm., linear-lanceolate to almost linear, acute, entire, often undulate, obscurely 3-veined, gradually narrowed at base and sheathing, sometimes somewhat petiolate, more or less densely sericeous-lanate. Scapes 10-35 cm. long, about twice as long as leaves, erect or ascending, terete, tomentose; spikes

DIPSACALES

LXXXIX. CAPRIFOLIACEAE

(1-3-10 cm. long, shorter than rest of scape, dense or lax above or interrupted below. Bracts 2.5-4.5 mm. long, ovate, obtuse, broadly keeled with wide scarious margins, shortly villous at least at apex, green or brownish. Sepals 3-4 mm. long, subequal, oblong-ovate, subobtusate, with wide scarious margins, weakly keeled to the apex, villous towards apex. Corolla-tube 3-4 mm. long, glabrous; lobes 2.5-3.5 mm. long, ovate, abruptly acuminate, pale brownish, glabrous. Stamens 7-10 mm. long, exerted 4-7 mm.; anthers white. Capsule c. 4 mm. long, ovoid; seeds 2; 2.5-3 mm. long, cymbiform, concave-convex, brownish, slightly rough, scarcely shiny. $2n = 20, 730$. Fl. 4-5.

Roadsides, paths and walls. *Malta*: rare at Xemxija (S. & C.G.; Borg); Floriana glais (G. Lanfranco). *Gozo*: the citadel walls at Rabat (Duthie, S. & C.G.; Borg).

Mediterranean region; W. Asia.

8. *P. halleri* Ail.

Hairy Plantain

Annual with one or few rosettes. Leaves 2-7(-10) x 0.1-0.5 cm., linear-lanceolate, acute, entire or remotely denticulate, 3-veined, laxly to densely villous with more or less patent hairs, gradually narrowed at base and sheathing. Scape usually 17, 3-10(-15) cm. high, equalling or longer than leaves, ascending or erect, terete, densely patent hairy with both long and short, brownish hairs; spikes 1-2 (-4) cm. long, ovoid or oblong, dense. Bracts 3-6 mm. (the lower up to 8 mm.) long, oblong-lanceolate, subacute, with scarious margin narrower than greenish keel, villous. Sepals unequal, almost free, subacute, keeled, villous, the anterior 4-5 mm. long, with very narrow scarious margin; the posterior 3-4 mm. long, with wide scarious margin. Corolla-tube c. 3.5 mm. long, glabrous; lobes c. 2 mm. long, ovate-lanceolate, acuminate, pale brownish. Stamens c. 5 mm. long, exerted c. 2 mm., anthers white. Capsule c. 2.5 mm. long, globose-oblong; seeds 2, c. 1.75 mm. long, broadly oblong-ellipsoid; pale brown, reticulate-alveolate, dull, concave-convex with narrow groove. $2n = 10$. Fl. 3-5.

Arid sandy places. *Malta*: St. Andrews, St. Paul's Bay, Marfa Peninsula (S. & C.G.; Borg); Bahar il-Caghaq (Borg). *Gozo*: Ta' Cené, Nadur, Xaghra (S. & C.G.; Borg); Ghajnsielem (Borg).

Mediterranean region, W. Asia.

Subgen. *Psyllium* (Juss.) Harms. Leaves opposite on branched stems.

9. *P. afra* L.

Zerrighet il-brighet Glandular Plantain

P. psidium L. 1762, non L. 1753.

Annual; stems up to 50 cm. high, erect, usually with ascending branches, straight, shortly pubescent, with patent or ascending hairs, glandular-pubescent above. Leaves 3-8 x 0.1-0.3(-0.4) cm., linear or linear-lanceolate, obtuse, entire or remotely dentate, not fleshy, pubescent. Peduncles 1-6 cm. long, scabrid-puberulent with ascending hairs; spikes 0.5-1.5 cm. long, globose to ovoid-oblong. Bracts 3.5-8 mm. long, ovate-lanceolate to lanceolate, acute or acuminate, with wide scarious margins below, without lateral veins. Sepals 3-4.5 mm. long, equal, oblanceolate, with wide scarious margins. Corolla-tube 3.5-4 mm. long, lobes c. 2 mm. long, ovate-lanceolate, acute. Capsule c. 2 mm. long, ovoid; seeds c. 2.5 mm. in diameter, narrowly oblong, reddish or blackish-brown, smooth, shiny. $2n = 12$. Fl. 1-5.

Cultivated and waste places. *Malta* and *Gozo*: very common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region; W. Asia.

Woody plants (rarely herbaceous). Leaves opposite. Stipules 0, or small and adnate to petiole (rarely conspicuous). Inflorescence cymose. Flowers (3-)5-merous, epigynous, usually actinomorphic. Calyx small. Corolla gamopetalous. Stamens 5, epipetalous, alternating with corolla lobes; anthers longitudinally dehiscent. Ovary 1- to 5-carpellary; style 1 or absent; stigmas free or united. Ovules 1 to numerous, pendulous, anatropous. Fruit a berry, drupe or achene, rarely a capsule. Seeds endospermic, with small straight embryo.

Leaves pinnate; fruit black

1. *Sambucus*

Leaves simple; fruit red

2. *Lonicera*

1. *Sambucus* L.

Shrubs or small trees, rarely herbs. Stems with a large pith. Leaves pinnate, deciduous, stipulate or exstipulate. Flowers (3-)5-merous, small, regular, in cymose corymbs or panicles. Corolla rotate. Stamens 5. Stigma sessile, 3- to 5-lobed. Ovary 3-5-locular. Fruit a drupe with 3-5 compressed, cartilaginous, 1-seeded stones.

Herb; stipule leafy, conspicuous

1. *ebulus*

Shrub or small tree; stipules absent or very small

2. *nigra*

1. *S. ebulus* L.

Sebbuqa salvagga Dwarf Elder

Perennial, foetid, glabrous herb 60-200 cm. high, with creeping rhizome; stems many, stout, erect, grooved, simple or little branched. Leaflets 5-13, 5-16 x 1-4.5 cm., oblong or oblong-lanceolate, acuminate, sharply serrate. Stipules conspicuous, more or less ovate. Inflorescence flat-topped, 7-10 cm. in diameter, corymbose with 3 (-4) primary rays. Corolla white, sometimes pink-tinged outside. Anther purple. Fruit globose, black. $2n = 36$. Fl. 4-5.

Humid places. *Malta*: rare (G. Lanfranco) as at Gnien il-Kbir, Gnien Fieres, Kordin (S. & C.G.; Borg); Wied tal-Isqof (Gauci). *Gozo*: Xlendi, Wied il-Lunzjata (S. & C.G.; Borg); Gnien Xibla, near Xaghra (Borg).

C. and S. Europe extending northwards to the British Isles; Mediterranean region; W. Asia to Himalaya; Madeira (probably introduced).

2. *S. nigra* L.

Plate XLIII

Sigra las-Sebbuqa kbira Common Elder

Shrub or small tree up to 10 m. high. Bark brownish-grey, deeply furrowed, corky. Stems often with vigorous, erect shoots from base, branches often arching. Twigs stout, with prominent lenticels. Leaflets 5-7(-9), 4.5-2(-11.8) x 2-6(-10) cm., ovate, ovate-lanceolate or ovate-elliptic, acuminate, serrate sparsely pubescent beneath. Stipules 0 or very small, subulate. Inflorescence flat-topped, 10-24 cm. in diameter, corymbose with (4-5) primary rays. Corolla c. 5 mm. in diameter, creamy-white. Anthers cream. Fruit 6-8 mm. in diameter, globose, usually black. $2n = 36$. Fl. 6-7.

Formerly cultivated for medicinal purposes and associated with farmsteads. *Malta*: Buskett (Borg); Bahrija (Bahrija School); Wied Ghar Dalam (Gauci). *Gozo*: Għajnsielem, Fergla (Wolseley).

Europe from Scandinavia southwards; W. Asia; N. Africa; Açores.

(*Viburnum tinus* L. is frequently cultivated for ornament (Borg).)

2. *Lonicera* L.

Shrubs or woody climbers. Leaves opposite, deciduous or rarely evergreen, entire, exstipulate. Flowers in axillary pairs, terminal heads or whorls. Bracts usually present. Bracteoles free or connate, rarely absent. Corolla 5-lobed, regular, 2-lipped with a 4-lobed upper lip; tube sometimes gibbous. Stamens 5. Stigma capitate. Ovary 2- to 3- (to 5-) locular, the walls of the ovaries of paired flowers sometimes united. Fruit a berry.

1. *L. implexa* Aiton Plate XLII Evergreen Honeysuckle

Evergreen, much branched. Twigs glabrous, glaucous. Leaves 2-8 x (1-) 2-4 cm., ovate to oblong, acute or subacute and mucronulate at apex, usually auriculate at base, sessile or connate on the upper part of the twigs, dark green and shining above, glaucous beneath, usually glabrous. Inflorescence sessile, with 2-6(-9) flowers. Corolla (1.8-) 2.5-4.5 cm. long, whitish-yellow, often tinged with red; tube 3-4 times as long as limb, glandular-puberulent outside and pubescent within. Style sericeous. Berries red. Fl. 4-5.

Rocky valleys amongst shrubs. *Malta*: locally frequent (G. Lanfranco; Wolseley), as at Mtahleb, Ballut (S. & C.G.); Wied Babu, Ta' Baldu, Maqluba, Wied Gerżuma (S. & C.G.; Borg); Buskett, Mellieha, Wardija, Ahrax, Pwales, Bahrija (Borg). *Gozo*: Mgarr ix-Xini, Wied Qorrot (S. & C.G.; Borg); Mgarr near Fort Chambray, Nadur, Xlendi (Borg).

Mediterranean region.

Lonicera caprifolium L. is often cultivated in gardens (Borg).

XC. VALERIANACEAE

Annual to perennial herbs, sometimes woody at the base, often with strong smelling rhizomes. Leaves opposite, whorled or basal, exstipulate. Inflorescence cymose, often capitate. Flowers generally small, usually zygomorphic, hermaphrodite or unisexual. Calyx often inrolled in flower and forming a feathery pappus in fruit. Corolla infundibuliform, the limb with (3-) 5 mm. or less unequal lobes. Stamens 1-4, inserted near the base of the corolla-tube, alternating with corolla lobes. Ovary 3-locular, 2 loculi sterile, the other with 1 pendulous ovule. Fruit dry, indehiscent, usually with a persistent, often accrescent calyx; seed 1, endospermic, with straight embryo.

- | | | |
|--|---|----|
| 1. Corolla tube spurred near base or prominently gibbous near the middle, stamen 1
Corolla tube without a spur, not or obscurely gibbous; stamens 2-3 | 3. <i>Centranthes</i> | 2. |
| 2. Corolla zygomorphic; stamens 2, or 3 with 2 connate
Corolla actinomorphic; stamens 3 | 1. <i>Fedia</i>
2. <i>Valerianella</i> | |

1. *Fedia* Moench

Annual. Leaves simple. Inflorescence cymose, many-flowered. Flowers mostly hermaphrodite. Calyx-segments 2-4. Corolla zygomorphic, 5-lobed; tube cylindrical with a very small boss c. $\frac{1}{4}$ from base. Stamens 2. Fruit an achene with 1 fertile and 2 sterile loculi.

1. *F. cornucopiae* (L.) Gaertner Plate XLIII Sicq il-handiema Horn-of-plenty

Plant glabrous, somewhat succulent. Stems 3-30 cm. high, usually branched. Leaves spatulate to elliptical, the lower 2-15 cm. long, more or less petiolate, usually entire; upper smaller, sessile, denticulate. Peduncles inrolled in fruit. Corolla 8-16 mm. long, purple with pin markings on the limb. Achenes mostly broadly ovoid; sterile loculi usually larger than fertile. Fl. 1-5.

Cultivated and waste places. *Malta*, *Gozo* and *Comino*: very common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region.

2. *Valerianella* Miller

Small annuals with apparently dichotomous branching. Flowers solitary in the forks of the branches and in terminal, bracteate, cymose heads. Calyx forming a toothed or funnel-shaped rim, or sometimes almost absent. Corolla infundibuliform, actinomorphic, not spurred or saccate at base, lobes 5. Stamens 3. Fruit of one, 1-seeded loculus and two distant, but sometimes small, sterile loculae.

- | | | |
|---|--|----|
| 1. Calyx limb in fruit about as long as fruit, with 6, triangular, acuminate lobes frequently hooked at apex
Calyx limb in fruit, not as above | 5. <i>coronata</i> | 3. |
| 2. Calyx in fruit with 3-6, distinct, but unequal, teeth
Calyx in fruit subentire, inconspicuous, or absent | 2. <i>ericaarpa</i> | 2. |
| 3. Fruit nearly quadrangular in section
Fruit ovoid or ovoid-obconical | 1. <i>carinata</i> | 4. |
| 4. Calyx limb shorter than fruit
Calyx limb more or less equalling fruit | 3. <i>microcarpa</i>
4. <i>truncata</i> | |

1. *V. carinata* Lois. Keel-fruited Cornsalad

Plant 7-40 cm. high, slender, glabrous. Leaves 2-7 cm. long, lower spatulate, upper oblong, entire or somewhat dentate. Cymes capitate. Flowers small, pale lilac. Calyx indistinctly 1-toothed. Fruit c. 2 x 0.75 mm., oblong, nearly quadrangular in section, fertile loculus not corky on the back, sterile locules nearly confluent. $2n = 18$. Fl. 4-6.

Gozo: Mgarr (Gulia; Borg).

W. & C. Europe; Mediterranean region.

2. *V. eriocarpa* Desv. Plate XLIII Hairy-fruited Cornsalad

Similar to *V. carinata* in general appearance. Stems rather rough. Cymes very dense. Calyx in fruit distinct, as broad as the fruit, oblique, strongly net-veined.

deeply 5-6-toothed, teeth subequal. Fruit c. 1 mm. long, oblong, more or less hispid, fertile loculus many times larger than the distant sterile ones. $2n = 14$. Fl. 3-4.

Cultivated and waste places. *Malta* and *Gozo*: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region.

3. *V. microcarpa* Lois.
V. puberula DC.

Small-fruited Cornsalad

Stems 5-23 cm. high, glabrous, branches patent, dichotomous. Lower leaves oblong, entire, upper linear, sometimes dentate below. Flowers in dense corymbs. Calyx limb short, entire, obliquely truncate; or with an ear-shaped, obtuse appendage shorter than the fruit. Corolla blue. Fruit rather small, ovoid, puberulent, ribbed on the lateral face, and with a protuberance and depression on the ventral one. Fl. 4-5.

Malta: rare (G. Lanfranco), as at peninsula of Marfa in sandy ground near the sea (S. & C.G.; Borg).

Mediterranean region.

4. *V. truncata* Betsche

Oblique-fruited Cornsalad

Stems 5-25 cm. high, erect, slightly rough at angles, branches patent, dichotomous, frequently to base. Lower leaves oblong-obovate, entire, upper linear-oblong, sometimes slightly dentate at base, hispid along margin and dorsal nervature. Flowers in dense corymbs. Calyx limb rather obliquely truncate, forming an ear-shaped appendage, entire or nearly so, about as long as fruit. Fruit rather small, ovoid, puberulent, weakly reticulate-veined on back and crossed on each side by a prominent rib, with an oval protuberance on ventral face. Fl. 4-5.

Cultivated places. *Malta*: much less common than *V. eriocarpa*, as at Wied Girenti, Kalafrana, Zebbieh, Gnejna (S. & C.G.; Borg). *Gozo*: Xlendi, neighbourhood of Nadur, Mgarr ix-Xini (S. & C.G.; Borg).

W. Mediterranean region.

5. *V. coronata* (L.) DC.

Crown Cornsalad

Stems 10-40 cm. high, erect, angular, puberulent, branches patent, dichotomous at top. Leaves ciliate, dentate or deeply pinnatifid at base, lower oblong, middle linear-lanceolate, upper linear. Flowers in subglobose corymbs, dense; bracts lanceolate, acute, appressed, scarious-ciliate at margin. Calyx-limb glabrous, campanulate, erect, larger than fruit and about as long, lobes 6, triangular, acuminate, frequently hooked at apex. Fruit oval, hairy, convex on back where crossed by 3 ribs, ventral face with oblong protuberance, sterile parts rather narrower than fertile. Fl. 3-6.

Malta: very rare, Kordn (Gulia; Borg). *Gozo*: Mgarr, Ta' Cené (Gulia; Borg).

C. Europe; Mediterranean region; W. Asia.

3. *Centranthus* DC.

Herbs, usually glaucous. Leaves entire or divided, the upper sessile, the lower more or less petiolate. Inflorescence a dichasial cyme; flowers bracteate. Calyx with 5-25 linear segments inrolled in flower, having the appearance of an epigynous ring, and developing into a plumose pappus in fruit. Corolla-tube gibbous near the middle or spurred near the base with an internal longitudinal membrane from the insertion of the spur to the mouth. Stamen 1. Fruit a cypsela with 1 fertile loculus and 2 much reduced sterile loculi, dorsiventrally compressed with 1- and 3-veined faces.

Perennial; leaves entire or sinuate-dentate
Annual; at least some leaves pinnatisect

1. *ruber*
2. *calcitrapa*

1. *C. ruber* (L.) DC.

Toppu tar-Regina
Red Valerian

Perennial. Stems 30-80 cm. high, ascending, usually branched. Leaves 37 x (0.5-) 1.3 cm., mostly lanceolate to ovate, obtuse to acuminate, patent; uppermost sometimes irregularly dentate, amplexicaul. Corolla red, pink-lilac or white, the tube (5-) 7-9(-10) mm. long; spur (2-) 5-7(-9) mm. long. $2n = 32$. Fl. 4-7.

Malta: cultivated and naturalised on old walls and in gardens (Borg).

Mediterranean region; naturalised in C. & W. Europe.

2. *C. calcitrapa* (L.) Duff.

Plate XLII

Pink Valerian

Annual. Stems 4-40(-75) cm. high, simple or branched. Leaves 1.5 x 1-3 cm., orbicular to obovate, at least the upper lyrate-pinnatifid, the lobes entire to serrate. Corolla pink or white, gibbous or shortly spurred with the spur not exceeding the base of the tube; tube 1.2(-3) mm. long. $2n = 32$. Fl. 3-5.

Rocky places and valleys. *Malta*: local as at Floriana (S. & C.G.); Wied Inčita, Wied Babu, Wied Qirda, Ta' Baldu, Gnejna (S. & C.G.; Borg); Buskett (Borg; E. Lanfranco); Bahrija, Wied Gerzuma (Borg); Wardija (Gauci); Wied Dalam (Wolseley). *Gozo*: Mgarr ix-Xini, Wied Qorrot, Wied ir-Rihan, Mgarr (S. & C.G.; Borg); Xlendi, Qala (Borg).

Mediterranean region.

XCI. DIPSACEAE

Annual to perennial herbs, rarely shrubs. Leaves opposite or verticillate, exstipulate. Flowers in a dense, cymose capitulum subtended by involucre bracts, often with marginal flowers radiate, rarely in a spike of verticillasters. Flowers hermaphrodite or female, usually zygomorphic, epigynous, each with a basal epicalyx ('involucre') of connate bracteoles which may be expanded distally into a 'corona', often subtended by a receptacular scale. Calyx small, cupuliform or divided into 4-5 teeth or numerous teeth or rigid hairs. Corolla-lobes 4-5, subequal or grouped in 2 lips. Stamens 2 or 4, epipetalous, alternating with corolla-lobes. Ovary inferior, 1-locular; ovule 1, pendulous; stigma simple or 2-lobed. Fruit dry, indehiscent, enclosed in epicalyx and often surmounted by persistent calyx; seed 1, endospermic, with straight embryo.

Stem with prickles
Stem without prickles

1. *Dipsacus*
2. *Scabiosa*

1. *Dipsacus* L.

Stout, biennial herbs, with spiny stems more or less branched above. Leaves opposite, often connate. Capitulum globose to subglobose, ovoid or cylindrical. Involucral bracts in 1-2 series, linear or lanceolate, erect to patent, with apical spine. Receptacular scales more or less spine-tipped. Involucre more or less 4-angled, united with the ovary below and ending in a short more or less 4-lobed cup. Calyx cupuliform, ciliate, persistent in fruit. Corolla with a long tube, unequally 4-fid. Achenes 4-angled, appressed-hairy.

1. *D. fullonum* L.
D. sylvestris Hudson

Teasel

Stems 50-200 cm. high, stout, erect, spiny on the angles. Basal leaves in a rosette, oblong-elliptical or oblanceolate, entire; cauline leaves sessile, linear-lanceolate, crenate-serrate, connate at base. Capitula 3-8 cm. in diameter, ovoid-cylindrical. Involucral bracts linear, unequal, curved upwards, the longest equalling or exceeding the flowers. Receptacular scales spinose-ciliate, with a rigid, recurved, apical spine, equalling the flowers. Corolla pinkish-purple. Achenes 3-4 mm., light brown, sulcate. $2n = 16, 18$. Fl. 6-7.

Malta: Wied Gerżuma (GD.; Borg).

Much of Europe except the north; W. Asia; N. Africa; Atlantic Islands.

2. *Scabiosa* L.

Annual to perennial herbs, rarely woody at base. Leaves opposite, simple or pinnate, often in non-flowering basal rosettes. Capitula long-pedunculate; involucral bracts herbaceous, 1- to 3-seriate. Receptacle hemispherical to cylindrical; receptacular bracts usually linear-lanceolate. Involucre tube cylindrical, 8-ribbed, expanded above into an orbicular or infundibuliform, scabrid crown with many, sometimes excurrent, veins. Calyx cupuliform below, the upper part usually prolonged into 5 rigid hairs. Corolla with 5 unequal lobes and a short tube, usually longer in marginal than central flowers.

1. *S. atropurpurea* L.
S. maritima L.

Plate XLIII

Southern Scabious

Subglabrous or somewhat hirsute biennial. Stem 20-60 cm. high, branched. Lower leaves oblong-spathulate, entire or lyrate, long-petiolate; middle and upper leaves pinnatifid, with entire or dentate segments. Capitulum 20-30 mm. in diameter, oblong-ellipsoid in fruit. Involucral bracts narrowly lanceolate, wider towards base, as long as or shorter than flowers. Corolla of marginal flowers 12-18 mm. long, slightly longer than the central, lilac to dark purple. Involucre tube hispid or subglabrous; crown about as long as tube, broadly infundibuliform; calyx-hairs c. 3-5 times as long as the crown, on long stipe. All fruits with long calyx-hairs. $2n = 16$. Fl. 5-8.

Roadsides and waste places. Malta and Gozo: common (S. & C.G.; Borg; G. Lanfranco; Haslam; Wolseley). Comino: rare (Borg; Wolseley).

Mediterranean region.

CAMPANULALES

XIII. CAMPANULACEAE

Herbs or small shrubs, usually with latex. Leaves usually alternate, exstipulate. Flowers hermaphrodite. Calyx 3- to 5-fid. Corolla more or less deeply lobed; lobes valvate. Stamens free or connate, sometimes epipetalous. Disc sometimes present. Style 1; stigma 2-5. Ovary inferior, 2- to 5-locular. Capsule dehiscing by pores or valves. Seeds numerous.

1. Ovary and capsule cylindrical
Ovary and capsule ovoid, globose or pyriform
2. Corolla tube more than 2 mm. wide; lobes usually erect
Corolla tube c. 1 mm. wide; lobes patent

2. *Legousia*

2.

1. *Campanula*
3. *Trachelium*

1. *Campanula* L.

Herbs. Inflorescence 1- to many-flowered. Ovary usually obconical or oblong-obconical. Calyx-lobes often longer than the ovary, with or without appendages between the lobes. Corolla campanulate, tubular, infundibuliform or rotate, usually blue, purple or lilac. Ovary 3- to 5-locular. Style without a disc at its base. Capitula pendulous or erect, dehiscing by pores or valves.

1. *C. erinus* L.

Plate XLIV

Small Bellflower

Hispid annual. Stem 3-10(-30) cm. high, dichotomously branched, weakly angular and striate. Leaves 1-2 cm. long, alternate or opposite, with rigid hairs, ovate or obovate, crenate-dentate, sometimes slightly lobed, sessile. Flowers terminal and axillary, sessile. Calyx-teeth erect, acute, deflexed after anthesis, shorter than the corolla. Corolla 3-5 mm. long, pale blue. Capsule urceolate, pendulous. $2n = 28$. Fl. 3-5.

Cultivated and waste places, rocks and old walls. Malta, Gozo and Comino: common (S. & C.G.; Borg; G. Lanfranco); apparently now less common as only seen at Ta' Baldu (Wolseley) and Madliena (Haslam).

Mediterranean region; W. Asia; Atlantic Islands.

2. *Legousia* Durando

Flowers in racemes or panicles. Calyx 5-fid. Corolla 5-fid, rotate or broadly campanulate. Stamens 5; filaments not or scarcely dilated at base; anthers free. Ovary cylindrical, many times longer than wide. Style puberulent; stigmas 3. Capsule dehiscing by 3, upward curving valves near the apex.

1. *L. hybrida* (L.) Delarbre
Specularia hybrida (L.) A. DC.

Plate XLIV

Venus's-looking-glass

Shortly hispid annual 10-25 cm. high. Leaves oblong or oblong-obovate, strongly undulate, the lower petiolate, the upper sessile. Flowers few, sessile, mostly in small terminal clusters. Calyx-lobes c. $\frac{1}{2}$ as long as the ovary at flowering time, linear-lanceolate, acute or obtuse, erect or erecto-patent. Corolla c. $\frac{1}{2}$ as long as calyx-lobes, reddish-purple to lilac. Capsule 15-30 mm., narrowed at top.

Arable fields among crops. Malta: rare at Zebbieh, Zurrieq (S. & C.G.; Borg);

Hal-Farrug (Gulia; S. & C.G.; Borg; G. Lanfranco); Mgarr, Gnejna (Borg). Gozo: Madonna tal-Qala (Duthie; Borg).

W. Europe; Mediterranean region.

3. *Trachelium* L.

Flowers in corymbs. Calyx 5-fid. Corolla tubular, with 5 ovate lobes. Stamens 5; filaments glabrous; anthers free, not or little exerted. Style exerted only near the apex; stigmas 2-3, small. Capsule dehiscing by 2-3 pores near the base.

1. *T. caeruleum* L. subsp. *caeruleum*

Trachelium

Almost glabrous perennial with stout stock. Stems up to 100 cm. high, woody at base. Leaves ovate to lanceolate, biserrate, usually ciliolate, petiolate. Corolla-tube 4-6 mm. long, very slender; lobes blue. Capsule pyriform. Fl. 5-9.

Shaded walls. Malta: naturalised in old gardens as at San Anton, Buskett (Borg).

W. Mediterranean region; often cultivated for ornament.

XIII. COMPOSITAE

Herbs or sometimes woody plants of very diverse habit; often with latex or oil-canals, rarely with both. Leaves exstipulate. Flowers small (*florets*), aggregated into heads (*capitula*) simulating a single larger flower and surrounded by a calyx-like involucre of one or more rows of bracts which vary greatly in number, arrangement, form and consistency. Receptacle of the head expanded and concave, flat, convex or elongated-conical, pitted with the margins of the pits flat, dentate, ciliate or dentate-ciliate, each floret sometimes subtended by scales. Florets all similar or central and marginal florets different, and then the central florets usually hermaphrodite or rarely male, the outer female or rarely neuter, but very variable. Corolla gamopetalous, variable in form but in three main types (i) *tubular*, actinomorphic, the corolla-tube surmounted by 5 more or less short, equal teeth (ii) *tubular*, 2-lipped; (iii) *ligulate*, the corolla-tube prolonged only along one side as a strap-shaped 'ligule', usually 3- or 5-toothed at its tip. Stamens 5, epipetalous; their anthers often sagittate or caudate below and often with terminal appendages, usually united laterally so that they form a closed cylinder round the style; dehiscence introrse, into the interior of the cylinder. Ovary inferior, 1-celled, with 1 basal anatropous ovule having a single integument; style single below but branching above into 2 stigmatic arms of variable length and shape. Fruit an *achene* crowned by a *pappus* of simple or plumose hairs in one or more rows, or of a smaller number of membranous scales, or of teeth, or a continuous membranous ring, sometimes 0; sometimes with a slender beak between achene and pappus. Seeds non-endospermic, usually oily.

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|--|-----|
| 1. Plant without latex; inner florets never ligulate | 2. |
| Plant with latex; all florets ligulate | 50. |
| 2. Leaves and involucre bracts never spiny; style not thickened below the branches | 3. |
| Leaves and involucre bracts often spiny; style thickened below the branches | 38. |
| 3. At least some leaves opposite | 4. |
| All leaves alternate or rosulate | 6. |

- | | | |
|---|-----------------------|-----|
| 4. Pappus of numerous hairs | 1. <i>Eupatorium</i> | 5. |
| Pappus not of numerous hairs | | |
| 5. Pappus of scales | 15. <i>Helianthus</i> | |
| Pappus absent | 16. <i>Ambrosia</i> | |
| 6. Capitula unisexual | 17. <i>Xanthium</i> | 7. |
| Capitula hermaphrodite | | |
| 7. Ligules absent | | 8. |
| Ligules present, though sometimes small | | 18. |
| 8. Receptacular scales present | | 9. |
| Receptacular scales absent | | 10. |
| 9. Scales subtending the outer row of florets only | 6. <i>Filago</i> | |
| Scales subtending most or all of the florets | 18. <i>Anthemis</i> | |
| 10. Achenes with a pappus of numerous hairs | | 11. |
| Achenes without a pappus of numerous hairs | | 15. |
| 11. Involucre bracts in 1-2 rows, the outer when present very small | 29. <i>Senecio</i> | 12. |
| Involucre bracts in 3-many rows | | |
| 12. Anthers not sagittate and without filiform appendages at base | | 13. |
| Anthers sagittate, with 2 filiform appendages at base | | 14. |
| 13. Plant glabrous | 3. <i>Aster</i> | |
| Plant tomentose | 7. <i>Phagnalon</i> | |
| 14. Plant without glandular hairs | 8. <i>Helichrysum</i> | |
| Plant with numerous short glandular hairs | 10. <i>Jasione</i> | |
| 15. Leaves not pinnatisect | 5. <i>Evax</i> | 16. |
| At least some leaves pinnatisect | | |
| 16. Plant grey to whitish silky-hairy; involucre less than 4 mm. long | 28. <i>Artemisia</i> | 17. |
| Plant not silky-hairy; involucre more than 4 mm. long | | |
| 17. At least some leaves 2- to 3- pinnatisect | 23. <i>Matricaria</i> | |
| Leaves 1-pinnatisect | 27. <i>Tanacetum</i> | |
| 18. Receptacular scales present | | 19. |
| Receptacular scales absent | | 25. |
| 19. Ligules white or purplish | | 20. |
| Ligules yellow | | 23. |
| 20. Capitula small, in corymbs | 22. <i>Achillea</i> | 21. |
| Capitula medium, solitary on the ends of branches | | |
| 21. At least the outer achenes strongly winged; tubular florets often with 2 corolla-lobes longer than the others | 21. <i>Anacyclus</i> | |
| Achenes not winged; corolla lobes of tubular florets equal | | 22. |

| | | |
|---|--------------------------|-----|
| 22. Corolla of tubular florets not saccate or spurred at base
Corolla of tubular florets saccate or spurred at base | 18. <i>Anthemis</i> | |
| 23. Leaves pinnatisect
Leaves not pinnatisect | 19. <i>Chamaemelum</i> | |
| 24. Corolla-tube of inner florets compressed and sometimes winged; outer achenes flat, winged
Corolla-tube of inner florets terete; outer achenes more or less triquetrous | 20. <i>Cladanthus</i> | 24. |
| 25. Inner achenes strongly arcuate to annular, muricate on the back
Inner achenes not strongly arcuate to annular, not muricate on the back | 13. <i>Pallenis</i> | |
| 26. Involucral bracts in 1 row, sometimes with a few shorter outer ones
Involucral bracts in 2 or more rows | 14. <i>Asteriscus</i> | |
| 27. Pappus of numerous hairs
Pappus not of numerous hairs | 30. <i>Calendula</i> | 26. |
| 28. Ligules not yellow
Ligules yellow | 29. <i>Senecio</i> | 27. |
| 29. Plants glabrous
Plants hairy | | 28. |
| 30. Pappus of 1 row of hairs
Pappus of 1 row of hairs surrounded by a crenulate corona | 3. <i>Aster</i> | 29. |
| 31. Corona stipitate
Corona sessile | 4. <i>Conyza</i> | 30. |
| 32. Leaves not pinnatisect
Leaves pinnatisect | 9. <i>Inula</i> | 31. |
| 33. Achenes strongly compressed
Achenes angled or subterete | 11. <i>Cupularia</i> | 33. |
| 34. Ligules yellow
Ligules white | 12. <i>Pulicaria</i> | 36. |
| 35. Corolla of tubular florets compressed and winged below; pericarp with resin-canals
Corolla of tubular florets unwinged; pericarp without resin-canals | 2. <i>Bellis</i> | 34. |
| 36. Ligules yellow
Ligules white | 24. <i>Chrysanthemum</i> | 35. |
| 37. Achenes ribbed on ventral side only
Achenes evenly ribbed all round | 26. <i>Leucaethemum</i> | |
| | 27. <i>Tanacetum</i> | |
| | 25. <i>Pinardia</i> | 37. |
| | 23. <i>Chamomilla</i> | |
| | 26. <i>Leucanthemum</i> | |

| | | |
|--|-------------------------|-----|
| 38. At least some pappus hairs more or less plumose
Pappus of simple hairs or scales | 39. <i>Notobasis</i> | 39. |
| 39. Involucre less than 25 mm. long
Involucre more than 25 mm. long | | 40. |
| 40. Achenes compressed
Achenes more or less cylindrical | 33. <i>Notobasis</i> | 41. |
| 41. Leaves white-tomentose beneath
Leaves grey arachnoid pubescent beneath | 32. <i>Galactites</i> | |
| 42. Achenes hairy
Achenes glabrous | 33. <i>Notobasis</i> | |
| 43. Receptacle glabrous
Receptacle with hairs or scales | 41. <i>Carlina</i> | 43. |
| 44. Pappus 25-40 mm. long
Pappus 9-28 mm. long | 34. <i>Onopordon</i> | 44. |
| 45. Leaves without spines
Leaves with spines | 35. <i>Cynara</i> | 45. |
| 46. Receptacle with linear-subulate scales
Receptacle hairy, but without scales | 40. <i>Carduncellus</i> | 47. |
| 47. Stems with spiny wings
Stems without spiny wings | 27. <i>Crupina</i> | |
| 48. Florets blue
Florets yellow or purple | 38. <i>Centaurea</i> | |
| 49. Leaves glabrous, conspicuously white-veined above
Leaves subglabrous or lanate-arachnoid, not conspicuously white-veined above | 31. <i>Carduus</i> | 48. |
| 50. Leaves all basal, though flowering stems may have a few small bracts
Stems with at least one well-developed cauline leaf | 43. <i>Echinos</i> | 49. |
| 51. Receptacle with scales
Receptacle without scales | 36. <i>Silybum</i> | 51. |
| 52. At least some pappus hairs plumose
Pappus of simple hairs, or scales, or both | 39. <i>Carthamus</i> | 59. |
| 53. Perennial with long slender tubers; pappus hairs in 1-2 rows
Annual or perennial with taproot; pappus hairs in more than 2 rows | 51. <i>Hypochoeris</i> | 52. |
| 54. At least some achenes with pappus partially or entirely of scales
Pappus of simple hairs | 52. <i>Leontodon</i> | 53. |
| 55. Stems unbranched, usually without bracts; achenes muricate above | 54. <i>Scorzonera</i> | 54. |
| | 47. <i>Hyoseris</i> | 55. |
| | 61. <i>Taraxacum</i> | |

- Stems branched or unbranched, usually bracteate; achenes not muricate
56. Achenes with a coronula below the beak
Achenes without a coronula
57. Involucral bracts in 2 rows, outer much shorter than inner; plant not stoloniferous nor with long fibrous rhizomes
Involucral bracts in several rows; plant stoloniferous or with long fibrous rhizomes
58. Leaves glabrous or nearly so
Leaves with dense stellate hairs on lower surface and simple eglandular hairs throughout
59. Thistle-like plants with spiny leaves
Leaves not spiny
60. Receptacle with scales which enclose the achenes
Receptacle without scales
61. Pappus absent
Pappus of scales or hairs
62. Achenes strongly compressed
Achenes not compressed
63. Achenes beaked
Achenes not beaked
64. Pappus of uniform deciduous or persistent hairs at least the outer involucral bracts with scarious margins
Pappus of few, deciduous, rough hairs and more or less persistent softer hairs in fascicles; involucral bracts without scarious margins
65. Pappus of at least some achenes of scales
Pappus of all achenes of hairs
66. Receptacle with scales
Receptacle without scales
67. Ligules blue or purplish
Ligules yellow
68. At least some pappus hairs plumose
Pappus hairs simple
69. Involucral bracts in 1 row
Involucral bracts in 2 or more rows
70. Leaves lobed
Leaves entire
71. Pappus of 2 rows of deciduous hairs; plant hispid with hooked hairs
62. *Chondrilla*
63. *Crepis*
58. *Aetheorhiza*
65. *Pilosella*
44. *Scolymus*
59. *Sonchus*
49. *Rhagadiolus*
60. *Lactuca*
57. *Launaea*
59. *Sonchus*
46. *Catananche*
45. *Cichorium*
48. *Hedypnois*
50. *Urospermum*
54. *Tragopogon*
53. *Picris*

- Pappus of more than 2 rows of persistent hairs; plant glabrous or with soft hairs without hooks
72. Achenes with a coronula below the beak
Achenes without a coronula
73. Achenes densely villous
Achenes not villous
74. Receptacle with scales
Receptacle without scales
75. Receptacle with long, silky hairs equalling or exceeding the florets
Receptacle glabrous or with short hairs
76. Achenes strongly rugose
Achenes not rugose
55. *Scorzonera*
62. *Chondrilla*
54. *Scorzonera*
51. *Hypochoeris*
64. *Andryala*
56. *Reichardia*
63. *Crepis*

Subfam. CARDUOIDEAE (TUBIFLORAE)

No latex present; corolla of disk-florets never ligulate.

Tribe Eupatorieae Cass. Leaves usually opposite, simple. Capitula without ligules; florets all hermaphrodite; corolla not yellow. Receptacle without scales. Anthers obtuse at base. Style branches obtuse or clavate, finely papillose. Pappus of hairs.

1. Eupatorium L.

Perennial herbs or shrubs. Leaves usually opposite. Capitula few-flowered, in terminal corymbs or panicles. Involucral bracts few, loosely imbricate in 2-3 rows. Receptacle flat, naked. Florets all tubular, hermaphrodite, actinomorphic, 5-merous. Achenes 5-angled; pappus of denticulate hairs in 1 row.

1. *E. cannabinum* L.

Hemp-agrimony

Perennial herb with woody rootstock, 30-120 cm. high; stem erect, simple or shortly branched, downy. Basal leaves oblanceolate, petiolate; cauline 3(-5)-partite with elliptic, acuminate, dentate segments 5-10 cm. long, subsessile; branch leaves simple, ovate or lanceolate; all shortly hairy and gland-dotted. Capitula in dense terminal corymbs, each with 5-6 reddish-mauve or white florets. Involucre c. 6 mm. long; bracts c. 10, oblong, purple-tipped, more or less scarious. Achenes blackish, gland-dotted; pappus whitish. $2n = 20$. Fl. 4-10.

Malta: naturalised on walls at San Anton and other old gardens (Borg).

Throughout Europe; W. and C. Asia; N. Africa.

Tribe Astereae Cass. Leaves alternate, simple. Capitula with or without ligules; outer florets female or sterile, the inner hermaphrodite or male; ligules yellow, white or purple, the tubular florets most often yellow. Receptacle without scales. Anthers usually obtuse at base. Style branches flattened, acute or subobtuse; stigmatic surface marginal, usually not reaching apex. Pappus most often of hairs.

2. *Bellis* L.

Small annual or perennial herbs. Leaves alternate or basal, entire, to serrate-crenate. Capitula solitary. Involucral bracts in 2 rows, subequal, herbaceous. Receptacle

conical to nearly flat; scales absent. Outer florets ligulate, female; ligules toothed or entire, patent, white often tinged with purplish-crimson. Inner florets 4- or 5-lobed, yellow; corolla-tube campanulate. Achenes compressed, with thickened margins; pappus absent, rarely represented by a ring of very short rigid hairs.

Annual; roots very slender; involucre bracts 2.5-3.5 mm. long

Perennial; roots fleshy; involucre bracts (5-)7-10 mm. long

1. *annua*

2. *syvestris* Cyr.

1. *B. annua* L.

Plate XLIV

Bebuna

Annual Daisy

Subglabrous to hispid, annual (2.5-)5-12 (20) cm. high. Leaves 6-25 x 3-15 mm., oblanceolate-ligulate to broadly obovate-spathulate, crenate-serrate to entire; petiole usually distinct in lower leaves, less so in the upper. Peduncles 1.5-10 cm. long, slender. Capitula 5-15 (20) mm. in diameter. Involucre bracts 2.5-3.5 mm. long, subacute. Ligules 4.5-8 mm. long, often tinged with purplish-red beneath. Achenes pubescent. $2n = 18$. Fl. 12-4.

Shallow soil in rocky places. *Malta, Gozo and Comino*: very common (S. & C.G.; Borg; G. Lanfranco; Haslam; Wolseley).

Mediterranean region; Atlantic Islands.

2. *B. sylvestris* Cyr.

Margherita salvaggia

Large Daisy

Perennial 30-30 cm. high. Leaves (15-)30-120 x 5-25 mm., linear-oblong to narrowly obovate, remotely serrate to subentire, appressed-pubescent at least when young, dark green, narrowed very gradually to a short, scarcely distinct petiole. Capitula 20-40 mm. in diameter; receptacle conical to hemispherical. Involucre bracts (5-)7-10 mm. long, oblong-lanceolate, more or less acute. Ligules 8-14 mm. long, tinged with purplish-red beneath and often also above. Achenes pubescent, sometimes with a rudimentary pappus of short bristles. $2n = 36, 54$. Fl. 9-3.

Valleys and damp places. *Malta, Gozo and Comino*: frequent (S. & C.G.; Borg; G. Lanfranco; Haslam; Wolseley).

Mediterranean region.

3. *Aster* L.

Herbs, usually perennials. Leaves alternate or basal, simple. Capitula small to medium, one to many in corymbs or panicles. Involucre bracts in 2 nearly equal rows or in 3 several rows, imbricate with the outer much shorter than the inner. Receptacle flat or convex. Outer florets ligulate, female or sterile, in 1 row (sometimes absent); ligules blue, violet, purple, pink or white. Inner florets tubular, hermaphrodite, yellow. Achenes oblong, usually compressed, more or less hairy and often glandular. Pappus-hairs scabrid, whitish to yellowish or reddish, often unequal, in 1 or 2 indistinct rows.

1. *A. squamatus* (Sprengel) Hieron.

Plate XLIV

Narrow-leaved Aster

A. subulatus sensu Lanfranco

Annual or biennial 30-100 cm. high. Stem erect or ascending, glabrous. Leaves mostly linear or linear-lanceolate, entire. Capitula in symmetrical panicles. Involucre bracts in 3 rows, oblong or oblanceolate, tapered near the purplish, serrulate

apex to an acute or mucronate point, appressed, the longest 5-8 mm. Ligules violet-blue, about as long as the pappus, more numerous than the tubular florets. $2n = 20$. Fl. 6-8.

Naturalised on roadsides and in waste places. *Malta*: common in the N.E. (G. Lanfranco; Gauci; Wolseley).

A nearly cosmopolitan weed of warm climates; native in C. & S. America.

4. *Conyza* Less.

Herbs. Leaves alternate, simple. Involucre bracts imbricate, scarcely herbaceous. Receptacle flat, without scales. Female florets numerous, in several series, with a slender, tubular-filiform corolla, which is apically produced into a very short, narrow, white or rarely pinkish ligule up to 1 mm. long. Hermaphrodite florets few, fertile, mostly yellow. Anthers entire at base. Achenes flattened, 1- to 2-veined or veinless. Pappus of capillary rigid hairs.

1. *C. bonariensis* (L.) Cronq.

Plate XLIV

Zaghghia salvaggia

Erigeron crispus Bourret

South American Fleabane

Annual up to 250 cm. high, densely patent-hairy. Leaves numerous, narrow, oblanceolate, petiolate. Capitula often 10 mm. or more wide, in an elongate panicle, often with the side-branches overlapping the main axis. Involucre 4-6 mm. long, usually stiffly hairy, rarely glabrous or nearly so. Female florets 50-120 or more; ligules up to 0.3 mm. long. $2n = 36, 54$. Fl. 1-2.

Cultivated and waste places. *Malta, Gozo and Comino*: very common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Native of S. America; widely naturalised in the Mediterranean region.

Tribe *Inuleae* Cass. Leaves usually alternate, simple. Capitula with or without ligules; outer florets usually female, the inner hermaphrodite or male; ligules usually yellow. Receptacle with or without scales. Anthers sagittate and caudate at base. Style branches flattened, rounded at apex; stigmatic surface marginal and spiced. Pappus usually of hairs.

5. *Evax* Gaertner

Dwarf, sometimes acaulescent annuals. Cauline leaves alternate or opposite. Capitula in semiglobose, sessile clusters of (1-)16 with rosette-like rows of subtending leaves. Receptacle of individual capitula not fragmenting when bracts are pulled off, sometimes uniting into a secondary receptacle; without scales. Involucre bracts appressed, long-persistent. Female florets many, in the axils of bracts; hermaphrodite florets sterile, 2-5, in the middle of the receptacle. Achenes dorsally compressed, usually papillose or hairy; pappus absent.

1. *E. pygmaea* (L.) Pers.

Plate XLIV

Pygmy Cudweed

Stem 2-4 (-5) cm. high; lateral branches short, ascending. Cauline leaves 7-10 x 3 mm.; leaves forming rosettes round flower-clusters 10-15 x 2-5 mm., oblong-obovate, obtuse or shortly acute, patent, more or less rigid, whitish tomentose; 2-3 times as long as cluster. Clusters of capitula 5-13 mm. wide, very compact, subglabrous. Involucre bracts 4-4.3 x 1.5 - 1.8 mm., brownish-yellow, lanceolate-obovate to obovate, cuspidate, with arista c. 1 mm. long, glabrous. Florets 1.3-1.9 mm. long. Achenes c. 1 mm. long, dark brown obovoid, papillose. Fl. 3-5.

Arid and rocky places. *Malta, Gozo and Comino*: very common (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Cominotto*: (Duthie; Borg). *Selmunett*: (Borg).

Mediterranean region; Atlantic Islands.

6. *Filago* L.

Tomentose or lanate annuals. Leaves alternate. Capitula in pyramidal, ovoid or cylindrical, axillary and terminal clusters. Receptacle filiform, easily breaking from the cylindrical base and between the whorls of bracts when bracts are pulled off. Involucral bracts 3-5(-6) in a vertical row, aristate or acute. Florets all tubular; outer female, filiform in 2 to several rows in axils of bracts, without pappus, subtended by scales; inner both female and hermaphrodite, or only hermaphrodite, fertile or sterile, with or without pappus. Achenes slightly compressed laterally, free, all similar.

1. Leaves linear-lanceolate to oblong-lanceolate, widest at the base or in the lower half; capitula in dense clusters of (15-)20-50(-60).
Leaves linear-oblong to broadly obovate, widest in the upper half; capitula in more or less lax clusters of 3-30

2. Main stem usually well-developed, stiff, erect or ascending, or plant procumbent with rigid branches; cluster of capitula usually less numerous.
Cushion-plant with very short, much-branched main stem and procumbent slender branches; up to 150 clusters of capitula

1. *F. vulgaris* Lam.
F. germanica L. non Huds.

Plant XIV

1. *vulgaris*

2. *pyramidata*

3. *cosyrensis*

Common Cudweed

Stems 5-35 (-40) cm. high, erect, more or less regularly branched above the middle. Indumentum greyish-white. Leaves 12-20 (-30) x 1-3(-4) mm., linear-lanceolate to lanceolate, more or less undulate. Capitula 5 x 1.6 mm., more or less terete, in dense, globose clusters of (15-) 20-35(-40), 10-12 mm. wide, not overtopped by subtending leaves. Involucral bracts 4-5 x 1.1 mm., lanceolate, straight in fruit, yellowish, usually red-tinged, with a long yellow arista. Inner female florets 3 mm. long, 20-25; hermaphrodite 2.8 mm. long, (1-)2-3(-4). Achene 0.5-0.8 x 0.2 mm., oblong to ovoid, brown. $2n = 28$. Fl. 4-5.

Waste and rocky places. *Malta, Gozo and Comino*: common (S. & C.G.; Borg; Wolseley).

Most of Europe except the north and east; N. Africa; Asia; Atlantic Islands.

2. *F. pyramidata* L.
F. spathulata auct., non C. Presl

Broad-leaved Cudweed

Stems (2-)5-30(-40) cm. high, rigid. Indumentum greyish-white, appressed. Leaves (6-)10-15 mm., spatulate, more or less flat. Capitula 4-6 x 2.5 mm., pyramidal, sharply 5-angled, in clusters of 5-20, 6-12 mm. wide, overtopped by subtending leaves. Involucral bracts 3-4.5 x 1.2 mm., 4-6 in each vertical row, keeled, yellowish, without reddish colouration, softly lanate on the back, distinctly divergent in fruit, with a slightly recurved arista c. 1.5 mm. long. Inner female florets 5-7; hermaphrodite 2-2.5 mm. long, 4-7. Achenes 0.5-0.8 mm., oblong-cylindrical to oblong-obovoid. $2n = 28$. Fl. 4-5.

(Two varieties occur. Var. *pyramidata* has an erect, ascending or procumbent stem, branched from the base or above, with patent branches and rather long internodes; leaves 10-15 mm. long, oblong-obovate; capitula 5-6 mm. long, in clusters of 8-20, 8-14 mm. wide, not aggregated into a long series of aggregated clusters; inner female florets 2.5 mm. long. Var. *prostrata* (Fiori) Wagenitz has the stem branched from the base with procumbent branches and short internodes; leaves 6-12 mm. long, linear-oblong; capitula c. 4 mm. long, in clusters of 5-15, 6-10 mm. wide, aggregated and forming a more or less continuous series; inner female florets 2-2.2 mm. long.)

Dry places. *Malta, Gozo and Comino*: common (S. & C.G.; Borg; G. Lanfranco).

Mediterranean region and W. Europe.

3. *F. cosyrensis* Lojac.

Malta Cudweed

P. germanica var. *gussonei* Lojac.

Densely branched, caespitose cushion-plant 5-16 cm. wide; branches slender, procumbent, repeatedly branched, with up to 150 more or less aggregated clusters of capitula. Leaves 5-6 x 0.5-1 mm., linear-oblong to linear-spatulate, those subtending the clusters up to as long as the clusters. Capitula 4 x 2-2.5 mm., 5-angled, in clusters of 5-12, 6-8 mm. wide. Involucral bracts 3.5-4 x 1-1.3 mm., with a recurved arista 1.2-1.5 mm. long, the inner rather divergent in fruit. Inner female florets 1.3-2 mm. long, 1-4; hermaphrodite 1.5-1.7 mm. long, 5-6. Achenes 0.75 mm. long. Fl. 4-5.

Calcareous ground near the sea. *Malta*: common, especially in the southern and western part (Borg).

Lampedusa and Pantellaria.

7. *Phagnalon* Cass.

Dwarf shrubs. Leaves simple, alternate; margins entire, erose or distantly toothed. Capitula usually solitary at the ends of branches. Involucral bracts imbricate, in up to 5 rows. Receptacle flat; scales absent. Florets yellowish, all tubular; outer female, the inner hermaphrodite. Achenes cylindrical, somewhat compressed or angled, without a beak, usually hairy. Pappus hairs in 1-2 rows, simple, free.

1. Margin of middle involucral bracts undulate
Margin of middle involucral bracts flat

3. *saxatile*

2. Outer involucral bracts ovate to triangular, obtuse
Outer involucral bracts narrowly triangular to linear-lanceolate, acute

1. *rupestre* 2. *gracum*

1. *P. rupestre* (L.) DC.
P. tenorei C. Presl

Plate XLIV

Lixka
Rock Phagnalon

Dwarf shrub up to 50 cm. high. Stems erect, lanate. Leaves 10-40 mm. long, oblanceolate to obovate, densely lanate beneath, glabrescent or with occasional arachnoid hairs above, erose to remotely erose - dentate; margin somewhat revolute. Capitula solitary. Outer involucral bracts ovate to triangular, obtuse; inner lanceolate, acuminate, entire to erose. $2n = 18$. Fl. 3-5.

Cliffs, walls and coralline plateaus and slopes. *Malta, Gozo and Comino*: common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

W. & C. Mediterranean region.

2. *P. graecum* Boiss. & Heldr. Eastern Phagnalon
P. rupestre var. *graecum* (Boiss. & Heldr.) Borg

Dwarf shrub up to 30 cm. high. Stems ascending to erect, lanate. Leaves 15-25 mm. long, oblanceolate to obovate, densely lanate beneath, lanate to subglabrous above, irregularly sinuate-dentate to strongly crose-undulate. Capitula solitary. Outer involucral bracts narrowly triangular to lanceolate, acute, brownish; inner bracts linear-lanceolate, subacute, entire. Fl. 3-5.

Arid and stony places in valleys. *Malta*: frequent (S. & C.G.; Borg; G. Lanfranco). *Goza*: frequent (Borg); *Xlendi*, *Wied Bingemma* (S. & C.G.). *Comino*: frequent (Borg).

S.E. Europe.

3. *P. saxatile* (L.) Cass. Mediterranean Phagnalon

Dwarf shrub up to 60 cm. high. Stems ascending to erect, lanate. Leaves 25-35 mm. long, linear to linear-oblanccolate, greenish above with occasional woolly hairs, densely lanate beneath, crose or rarely remotely dentate; margin sometimes revolute. Capitula solitary. Middle involucral bracts linear-lanceolate, acute, margin undulate; inner bracts linear. $2n = 18$. Fl. 3-5.

Malta: Ghadira (Kramer & Westra).

Mediterranean region and S.W. Europe.

3. *Helichrysum* Miller

Annual, biennial or perennial herbs or suffrutescent perennials, often lanate or tomentose. Leaves alternate, exstipulate, simple and entire. Capitula small to medium, solitary or aggregated into compound corymbs. Involucre cylindrical-campanulate to hemispherical; bracts numerous, imbricate, scarious and white or coloured at least distally. Florets yellow, all tubular, the outer female fewer than the inner hermaphrodite. Pappus of rough or shortly plumose hairs.

1. *H. rupestre* (Rafin.) DC. Plate XLV *Sempreviva salvagga*
H. inodorum var. *rupestre* Rafin. Rock Helichrysum

Non-aromatic. Flowering stems 10-60 cm. high, angular, white-tomentose. Basal leaves 30-80 (-120) mm. long, crowded, patent, linear to narrowly lanceolate or oblanceolate, narrowest just above the base, white-tomentose on both sides, with revolute margins; upper shorter, narrower and less crowded, suberect or arcuate. Capitula in a large corymb (2-)3-7 cm. across, compact and subglobose to lax and umbrella-like; involucre 4-7 mm. in diameter, broadly ovoid to globose at first, becoming widely campanulate; involucral bracts laxly imbricate, the outermost usually half as long as or more than half as long as the innermost, all ovate, acute or the innermost oblong and obtuse; the outer scarious down to the glabrous or somewhat lanate base, the inner scarious above, coriaceous below; all shining yellow. Achenes dark brown, minutely tuberculate; pappus-hairs shortly plumose. Fl. 3-6.

Sea cliffs. *Malta*: Wied Babu (GD; Borg). *Goza*: Qala, Dwejra (Duthie; Godfrey; S. & C.G.; Borg; Gauci); Hagra tal-General (Borg; Evans; Gauci); Balluta (Penza).

W. and C. Mediterranean region.

9. *Inula* L.

Perennial, rarely biennial herbs, or small shrubs. Leaves simple, alternate. Capitula solitary or in a corymbose or paniculate inflorescence. Involucral bracts imbricate, in many rows. Receptacle flat or slightly convex, without scales. Florets yellow, the outer, ligulate, female, the ligule often very short. Tubular florets hermaphrodite. Achenes angled, not beaked. Pappus-hairs in 1 row, simple, free.

1. *I. crithmoides* L. Plate XLIV *Xorbett*
Golden Samphire

Glabrous, rarely somewhat glandular small shrub up to 100 cm. high. Leaves 20-45 (-60) x 2-4 (-9) mm., linear to linear-lanceolate, fleshy, entire or 3-toothed at apex. Capitula medium. Involucre hemispherical; outer bracts 3-4 x 0.5-1 mm., linear, erect, the inner 5-10 x 0.5-1 mm., linear-subulate. Ligules 14-25 mm. long, exceeding the involucre. Achenes 2-3 mm. long, hairy; pappus with 30 rigid hairs. $2n = 18$. Fl. 6-11.

Moist, rocky places near the sea. *Malta*, *Goza*, *Comino*, *Cominotto* and *Phila*: common (S. & C.G.; Borg; G. Lanfranco; Haslam; Wolseley); leaves eaten as a vegetable (S. & C.G.).

Coasts of Mediterranean region and W. Europe.

10. *Jasione* Cass.

Like *Inula* but ligules sometimes absent; achenes fusiform; pappus hairs in 2 rows, the outer short; the inner long, denticulate.

1. *J. glutinosa* (L.) DC. Plate XLIV *Tulliera salvagga*
Pointed-leaved *Jasione*

Plant with numerous short glandular and long flexuous eglandular hairs. Stem 10-45 cm. high, simple or branched. Leaves 15-30 mm. long, lanceolate, acute, erecto-patent, sessile. Inflorescence cymose-paniculate or corymbose; capitula medium. Involucre c. 6 mm. long; outer bracts much shorter than inner; herbaceous, glandular; inner bracts scarious, eglandular, ciliate. Ligules absent; disc-florets yellow. Achenes hairy, glandular at the apex; pappus reddish-brown. Fl. 5-10.

Walls, rocky sides of valleys and arid, stony places. *Malta* and *Goza*: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Comino* and *Semineit*: (Borg).

N. and E. Spain, S. France, *Islas Baleares*, *Lampedusa*.

11. *Cupularia* Gren. & Godron

Like *Inula* but capitula medium to small; achenes cylindrical; pappus-hairs in 2 rows, the outer short, connate, forming a crenulate, stipitate corona, the inner long, denticulate.

- Ligules 10-12 mm. long, distinctly exceeding the involucre 1. *viscosa*
Ligules 4-7 mm. long, not or scarcely exceeding the involucre 2. *graveolens*

1. *C. viscosa* (L.) Gren. & Godron Plate XLIV *Tulliera*
Inula viscosa (L.) Aiton Sticky Samphire

Densely viscid-glandular perennial 40-130 cm. high; stems woody at base. Lower leaves 30-70 x 2-30 mm., linear to oblong-lanceolate, acute, remotely denti-

culiate; upper sessile, semiamplexicaul. Capitula medium; involucre 6-8 mm. long; outer bracts 1-2 x 0.5-0.7 mm., linear-lanceolate, acute, erect; inner 6-8 x 0.6-0.8 mm. Ligules 10-12 mm. long, distinctly exceeding the involucre. Achenes about 2 mm. long, hairy; pappus of 15 rigid hairs. $2n = 18, 34$. Fl. 7-11.

Waste places, walls and abandoned fields. *Malta*, *Gozo* and *Comino*: common (S. & C.G.; Borg; G. Lanfranco; Haslam; Wolseley).

Mediterranean region; Atlantic Islands.

2. *C. graveolens* (L.) Gren. & Godron
Inula graveolens (L.) Desf.

Zaghzigha
Lesser Samphire

Erect, densely glandular annual 20-50 cm. high, smelling of camphor. Lower leaves 20-75 x 2-13 mm., lanceolate to oblong-lanceolate, entire or remotely denticulate, upper sessile, semiamplexicaul. Capitula small; involucre 4-7 mm. long; outer bracts c. 3 x 0.5-1 mm., linear-triangular; inner 4-7 x 0.7-1 mm., linear-lanceolate. Ligules 4-7 mm. long, not or scarcely exceeding the involucre. Achenes c. 2 mm. long, hairy; pappus with about 30 rigid hairs. $2n = 18, 20$. Fl. 9-10.

Cultivated and waste land. *Malta*, *Gozo* and *Comino*: very common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region, north to N.W. France; W. Asia.

12. *Pulicaria* Gaertner

Like *Inula* but the pappus consisting of a row of more or less connate small scales surrounding hairs.

Basal leaves withered at anthesis; stolons present; capitula usually numerous

Basal leaves green at anthesis; stolons absent; capitula few

1. *dysenterica*
2. *odora*

1. *P. dysenterica* (L.) Gaertner

Plate XLIV

Common Fleabane

Perennial with scaly stolons. Stems 20-60 cm. high, lanate or tomentose, freely branched. Leaves oblong-lanceolate, the lowest petiolate, withered at anthesis, the others sessile, usually widest near the semi-amplexicaul, auriculate base; all undulate, remotely serrate, green and scabrid above, grey-tomentose beneath. Capitula usually numerous, 1.5-3 cm. in diameter, hemispherical; peduncles 1.5-2.5 cm. long, not thickened above, without or with 1 bract. Involucral bracts linear to subulate, more or less lanate and glandular. Ligules c. 5 mm. longer than the involucre, patent. Pappus of scales connate for more than $\frac{1}{2}$ their length, surrounding 14-20 hairs. Achenes c. 1.5 mm. long, hairy. $2n = 18, 20$. Fl. 6-10.

Dry places. *Malta*: rare (G. Lanfranco), as at Buskett, Mosta (S. & C.G.; Borg); between Attard and Rabat (Borg; Ghajn il-Kbira (Wolseley).

S., W. & C. Europe, extending northwards to Denmark; N. Africa, S.W. Asia.

2. *P. odora* (L.) Reichenb.

Mediterranean Fleabane

Perennial with a short stock. Stems 20-70 cm. high, villous or lanate, simple or sparingly branched. Basal leaves ovate to ovate-lanceolate, shortly petiolate, green at anthesis; cauline leaves oblong-lanceolate, semiamplexicaul, the lower auriculate, glandular-denticulate, green and scabrid above, greyish-lanate beneath. Capitula 1 to few, 2-3 cm. in diameter, hemispherical; peduncles 3-15 cm. long, thickened above, usually with several bracts. Involucral bracts linear, long-acuminate, more or less

lanate and glandular. Ligules c. 8 mm. long, longer than involucre, patent. Pappus of scales free almost to the base, surrounding 10-12 hairs. Achenes c. 2 mm. long, hairy. $2n = 18$. Fl. 6-10.

Damp shady places. *Malta*: rare (G. Lanfranco), as at Wied Qirda, Buskett, Girda (S. & C.G.; Borg); Marsa, Lija, Wied il-Ghasel (Borg).

Mediterranean region.

13. *Pallenis* (Cass.) Cass.

Annual to biennial herbs. Stems leafy. Capitula medium, terminating the branches, heterogamous. Involucral bracts in 2-3 rows. Receptacle convex, with scales. Ligulate florets in 2 rows, female, yellow; disk-florets numerous, the tube compressed and sometimes with 1-2 narrow wings. Outer achenes flat, winged; inner slightly compressed, not or scarcely winged; pappus of numerous, short, hyaline scales.

1. *P. spinosa* (L.) Cass.

Plate XLV

Ghajn il-Baqra Xewwikija
Spiny Golden Star

Up to 50 cm. high, softly hairy. Stems hard, woody at base, usually branched, the branches overtopping the main stem. Leaves lanceolate to elliptical, obtuse-mucronate, the basal petiolate, the cauline sessile and semiamplexicaul. Outer involucral bracts 15-35 mm. long, ovate and coriaceous below, with a long, patent, spine-tipped leaf-like apex exceeding the ligules; inner ovate, coriaceous, with or without a short, narrow green apex. Ligules deeply 3-toothed at apex; disk-florets 5-lobed. Achenes 2-2.5 mm. long. Fl. 4-6.

Cultivated and waste places. *Malta*, *Gozo* and *Comino*: common (Borg; G. Lanfranco; Wolseley).

Mediterranean region.

14. *Asteriscus* Miller

Like *Pallenis* but sometimes perennial; disk florets with a terete tube; outer achenes more or less triquetrous or somewhat compressed, the rest terete.

1. *A. aquaticus* (L.) Less.

Plate XLV

Ghajn il-Baqra
Golden Star

Annual. Stem (2-) 10-50 cm. high, simple or with erect-patent branches, usually near the apex. Leaves oblanceolate, obtuse, the lower petiolate, the upper cauline sessile. Outer involucral bracts 10-20 mm. long, ovate and coriaceous below, with a long, leaf-like apex much exceeding the ligules; inner ovate, coriaceous, with or without a short green apex. Florets deep yellow. Ligules deeply 3-toothed at apex; disk-florets 5-lobed. Achenes 1.5-2 mm. long; pappus 0.75-1 mm. long. Fl. 4-6.

Coastal areas. *Malta*, *Gozo* and *Comino*: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region; Atlantic Islands.

15. *Helianthus* L.

Stout annual or perennial herbs. Leaves simple, the lower opposite, the others usually alternate. Capitula large. Involucral bracts imbricate, in 2 to several rows, herbaceous. Receptacle flat or slightly convex, with scales which partly enclose the achenes. Outer florets ligulate, sterile, yellow; inner florets hermaphrodite, fertile, corolla shortly 5-lobed. Achenes somewhat compressed and angled; pappus of 2 deciduous rigid hairs and rarely some small scales.

1. *H. tuberosus* L.

Artichok
Jerusalem Artichoke

Perennial; stems 100-200 cm. high, scabrid-hispid or glabrous, usually branched above. Rhizomes tuberosus. Leaves 100-250 x 70-150 mm., ovate, acuminate, coarsely serrate, scabrid above, whitish-pubescent beneath, narrowed into a winged petiole, the upper not much smaller. Capitula 40-80 mm. in diameter, several, erect. Involucral bracts at least as long as the diameter of the disk, more or less patent, lanceolate, acuminate, ciliate, dark green. Receptacle convex. Ligules 30-40 mm. long. Inner florets yellow. Achenes 5-6 mm. long, glabrous or hairy. $2n = 192$.

Malta and Gozo: cultivated for its tubers and occasionally escaping to become naturalised (Borg).

Native of N. America; widely cultivated elsewhere.

16. *Ambrosia* L.

Annual or perennial herbs. Leaves mostly opposite. Capitula unisexual, inconspicuous; male hemispherical, drooping, in terminal, ebracteate racemes; female in axils of the uppermost leaves, each with a single floret. Achene enclosed by the nut-like involucre; pappus absent; involucre usually with small spines or tubercles near apex.

1. *A. maritima* L.

Plate XLV

Mentna
Sea Ragwood

Erect, branched, aromatic annual up to 125 cm. high. Stems often woody below. Leaves petiolate, deeply 2-pinnate, densely grey-hairy beneath; lobes ovate to lanceolate. Male involucre 3 mm. in diameter, cup-shaped; bracts connate and crenately lobed; male flowers 10-15, corolla present. Female capitula in axillary clusters; fruiting involucre 5-angled, with 5 conical tubercles; beak 0.5 mm. long; female flowers without corolla. Achenes obovoid, smooth. Fl. 6-11.

Sandy places by the sea; rarely inland. Malta: rare (G. Lanfranco), as at St. Paul's Bay, Mellieha (S. & C.G.; Borg; Wolseley); Salini (S. & C.G.; Borg); Marsa (G.D.; Borg); Marfa Peninsula (S. & C.G.); Ghajn Rihana, Wied Qannota, Marsaskala, Ghajn Tuffieha, Bugibba, Bahar id-Caghaq, Qalet Marku (Borg). Gozo: Ramla (S. & C.G.); Marsalforn, Qbajjar (Borg). Comino: (Borg).

Mediterranean and Tropical African coasts.

17. *Xanthium* L.

Annual herbs. Leaves alternate, entire or variously lobed. Capitula solitary or in axillary clusters, unisexual, the male above the female. Male capitula subglobose; involucral bracts in 1 row; receptacle cylindrical, with scales; florets numerous; stamens 5; anthers free and hooked at apex; filaments connate; style and ovary rudimentary. Female capitula ovoid; involucral bracts in 2 rows, the outer small, free, the inner connate, coriaceous, prickly, ending in 2 (rarely 1) beaks and forming a 2-locular structure containing 2 florets, corolla absent; styles exerted through a hole on the inside of the beak near its base. Achenes ovoid; pappus absent.

Leaves long-petiolate, green beneath, without spines at base of petiole

1. *strumarium*

Leaves sessile or shortly petiolate, white or grey tomentose beneath, with 1-2, 3-fid, yellow spines at base (rarely replaced by small leaves)

2. *spinosum*

1. *X. strumarium* L.

Plate XLV

Rough Cocklebur

Stems 20-120 cm. high, usually branched, unarmed. Leaves long petiolate; lamina broadly ovate to triangular, with a cordate or rarely cuneate base, entire; or with 3-5 wide, coarsely serrate lobes, green and with short, stiff hairs on both surfaces. Capitula in axillary clusters and sometimes also in a terminal, leafless inflorescence the male above the female. Involucre in fruit with straight or hooked spines and distinct beaks. Fl. 7-10.

Valley bottoms. Malta: locally frequent (G. Lanfranco); as at Chadwick Lakes (Gauci; Wolseley), Wied il-Ghasel (Wolseley).

C. & S. Europe, a casual further north; probably an early introduction from S. America.

2. *X. spinosum* L.

Spiny Cocklebur

Stems 15-100 cm. high, much-branched, with 1-2, stout, 3-fid, yellow spines in the leaf-axils, the spines rarely more or less connate at the base or replaced by leaf-fascicles. Leaves sessile or shortly petiolate; lamina entire or 3-to 5-fid, dark green above, white or grey-tomentose beneath. Male capitula in terminal inflorescences; female axillary. Involucre 10-12 x 6-8 mm. in fruit, covered with slender spines. $2n = 36$. Fl. 9-11.

Malta: Marsa (S. & C.G.; Borg; Penza); Addolorata Cemetery (Borg). Gozo: Marsalforn (S. & C.G.; Borg; Penza).

Native of S. America; naturalised in many parts of the world.

Tribe Anthemideae Cass. Leaves alternate, very rarely opposite, simple or pinnatisect. Capitula with or without ligules; outer florets usually female or sterile, the inner hermaphrodite or male; ligules usually white or yellow. Receptacle with or without scales. Anthers usually obtuse at base. Style-branches truncate and papillose at apex. Pappus absent or with a corona or auricle.

18. *Anthemis* L.

Herbs or sometimes dwarf shrubs, with more or less dense indumentum. Leaves alternate, usually divided; petiole frequently pectinate-laciniate at base. Capitula solitary, terminal, pedunculate. Involucre usually hemispherical to subhemispherical; bracts in several rows. Receptacle conical, more or less convex; hemispherical or ovoid; scales usually present, at least in upper part of receptacle. Outer florets usually ligulate, female and fertile, with compressed tube and patent, usually 2- to 3-dentate ligule. Inner florets hermaphrodite, tubular, 5-dentate, numerous, yellow; tube not sacculate. Achenes more or less compressed or terete; pappus absent or represented by a corona or auricle.

Measurement of length of stem includes the peduncle; length of leaves usually includes both petiole and lamina; length of peduncle is taken from the uppermost cauline leaf to the base of the capitulum; length of ligules is that of the limb; measurements of achenes refer to the achenes of the tubular florets; number of striations on the achene include those of the outer and inner side, including that corresponding to the median (but not to each of the four faces of the achenes).

The primary divisions of the leaves are referred to as *segments* and the ultimate divisions as *lobes*.

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| 1. Receptacle without scales in the lower part; scales narrowly lanceolate to linear | 4. <i>cotula</i> | 2. |
| Receptacle with scales all over; scales wider | | |
| 2. At least the achenes of the outer tubular florets granulate or tuberculate | 3. <i>secundiramca</i> | 3. |
| Achenes of the tubular florets not tuberculate or granulate | | |
| 3. Involucral bracts obtuse | 1. <i>arvensis</i> | |
| Involucral bracts more or less acute | 2. <i>toementosa</i> | |

Sect. *Anthemis*. Annual or biennial with much-branched stems. Peduncles sometimes clavate in fruit. Inner involucral bracts with hyaline or sometimes brownish-scarious margin and apex. Receptacle conical or sometimes hemispherical; receptacular scales subpersistent, ending in a short or slightly rigid point. Ligules white, rarely pink. Achenes usually weakly 4-angled with smooth, granulate or rarely tuberculate ribs.

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| 1. <i>A. arvensis</i> L. | Bebuna tar-raba
Corn Chamomile |
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Sparsely hairy to densely pubescent annual, perhaps sometimes perennating. Stems (4.5-) 10-50 (-80) cm. high, usually more or less branched, often from the base, the basal branches as long as or longer than the main stem. Leaves obovate-oblong to obovate, 1- to 3-pinnatifid or pinnatisect, not glandular-punctate, more or less hairy; lobes acute, mucronate. Involucral bracts hairy, oblong or oblong-obovate, obtuse, with hyaline to brown scarious margin and apex. Receptacular scales acuminate. Achenes turbinate, (9-)10(-11)-ribbed; ribs obtuse, separated by narrow, deep furrows, smooth. $2n = 18$. Fl. 3-5.

(Two subspecies occur. Subsp. *arvensis* has the stems up to 80 cm. high, usually much branched; leaves 15-50 x 6-15 mm., rarely pink; and tubular florets c. 4 mm. long. Subsp. *incrassata* (Loisel.) Nyman has wider leaves with elliptical lobes; peduncles somewhat arcuate; receptacle more elongate in fruit; receptacle scales abruptly acuminate; ligules up to 11 x 4 mm.; and tubular florets 3-3.5 mm. long).

Fields and waste places. *Malta*, *Gozo* and *Comino*: common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Most of Europe except the extreme north; N. Africa; S.W. Asia.

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| 2. <i>A. toementosa</i> L. | Woolly Chamomile |
| <i>A. peregrina</i> L. | |

Tomentose or lanate annual. Stems 2-30 (-45) cm. high, 1 to many, the central erect and rather shorter than the lateral, simple or divaricately branched. Leaves up to 45 cm. long, 1- to 2-pinnatifid with cuneate-ovate to oblong, sometimes linear lobes. Capitula 15-37 mm. in diameter. Involucre hemispherical at anthesis; bracts lanate or more or less densely hairy, the outer bracts triangular-lanceolate, acute, the inner oblong or oblong-lanceolate, acute or subacute, with a rather narrow hyaline margin and apex. Ligules shorter than the diameter of the disk, sometimes absent. Corolla-tube not swollen. Receptacle 4-5 x 2.5-4 mm., conical; scales oblong to oblanceolate, shortly acuminate. Achenes 1.5-2 mm. long, obconical or obscurely obpyramidal, with more or less prominent ribs. Fl. 4-5.

Sandy places by the sea. *Malta*: Sliema (Delicata; Borg). *Comino*: (Gulia).

C. and E. Mediterranean region.

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| 3. <i>A. secundiramca</i> Biv. subsp. <i>urvilleana</i> (DC.) R. Fernandes | |
| Plate XLV | Bebuna tal-bahar
Prostrate Chamomile |

Annual, stems procumbent, much branched from the base, the central stem and main branches somewhat thickened from base up to apex, but rarely clavate. Leaves 1- to 2-pinnatisect, thick, glandular-punctate beneath. Involucre hemispherical, glabrous or sparsely hairy; bracts lanceolate, acute, the outer more than half as long as the middle. Receptacular scales broadly obovate, cuneate, very shortly mucronate, hyaline, shorter than or equalling florets. Ligules usually present. Tubular florets swollen and spongy in the lower $\frac{1}{2}$. Outer achenes obconical, distinctly ribbed, more or less granulate, with a very short crenulate rim; the others nearly smooth, denticulate at apex. Fl. 3-6.

Rocky places near the sea. *Malta*, *Gozo* and *Comino*: common (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Selmun*: (Borg).

The species occurs in the C. Mediterranean region; subsp. *urvilleana* is endemic to the Maltese Islands and Lampedusa.

Sect. *Marula* (Cass.) Griseb. Annual with branched stems. Involucral bracts with pale brown or hyaline margin. Receptacle conical to hemispherical; receptacular scales narrowly lanceolate to linear, subulate, sometimes absent in the lower part, more or less caducous. Achenes turbinate, circular in transverse section, with or without ribs.

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| 4. <i>A. cotula</i> L. | Stinking Chamomile |
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Annual (7-)20-50 (-70) cm. high, thinly tomentose, glabrescent. Stems corymbosely branched above. Leaves 15-65 x 5-30 mm., ovate or ovate-oblong in outline, irregularly 2- to 3-pinnatisect, the lobes narrowly linear, with hyaline, acuminate mucro, sparsely hairy, sometimes fleshy. Capitula 12-30 mm. in diameter; peduncles (2.5-)6-15 cm. long, not thickened above. Involucre hemispherical; bracts more or less oblong, acute to obtuse, with pale brown, scarious margin. Receptacle 5-8 x 1.5-3 mm., narrowly conical, without scales on the lower half; scales linear-subulate, shorter than to equaling the florets. Ligules 5-14 mm. long, sometimes absent. Achenes (1-)1.3-1.8 mm. long, turbinate, slightly constricted at the apex, 8- to 11-ribbed, the ribs tuberculate or verruculose. $2n = 18$. Fl. 3-6.

Fields. *Malta*: Marsa, Sliema (Delicata; Borg); Floriana, Pieta (Borg).

Throughout much of Europe except the north; N. and W. Asia.

19. *Chamaemelum* Miller

Annual or perennial herbs. Leaves 1- to 3-pinnatisect, alternate. Capitula medium, heterogamous, pedunculate. Involucral bracts in 2 to several rows, gradually decreasing in size outwards. Receptacle convex to conical, with scales. Outer florets usually ligulate, female or sterile; ligulate florets with a compressed, 2-winged tube and white, patent, entire or minutely 2- to 3-dentate ligule; inner florets tubular, yellow, the tube saccate at base and enclosing the apex of the achenes. Achenes slightly compressed, weakly striate on inner face; pappus absent.

Most cauline leaves 1-pinnatisect; involucre bracts greenish with a wide scarious margin

1. *mixtum*

Most cauline leaves 2-pinnatisect; involucre bracts with a dark brown margin and apex

2. *fuscatum*

1. *C. mixtum* (L.) All.

Anthemis mixta L.

Branched Chamomile

Somewhat pubescent annual 16-60 cm. high, often much branched, with divaricate branches. Leaves oblong or narrowly oblong in outline, the lower 1- to 2-pinnatisect, the upper 1-pinnatisect to serrate, sessile; lobes linear-lanceolate, entire or serrate, mucronate. Involucre 3-5 mm. long; bracts oblong, obtuse, greenish, with a wide scarious margin, somewhat lanate. Ligules c. 10 mm. long. Achenes c. 1 mm. long. Fl. 3-5.

Malta: frequent (Gulia); Għara; St. Julian's (Borg).

Mediterranean region; Atlantic Islands.

2. *C. fuscatum* (Brot.) Tutin

Anthemis fuscatum Brot.

Dark Chamomile

Glabrous annual 5-30 cm. high, simple or little-branched with ascending branches. Leaves oblong in outline, usually 2-pinnatisect; the lower petiolate, the upper sessile and sometimes 1-pinnatisect; lobes acute. Involucre 3-4 mm. long; bracts ovate, with dark brown margin and apex, deflexed in fruit. Ligules 7-10 mm. long. Fl. 3-6.

Malta: on the glaciis and ditches outside Porte de Bombes (S. & C.G.; Borg).

W. Mediterranean region.

20. *Cladanthus* Cass.

Annual herb. Leaves alternate, 1- to 2-pinnatisect. Capitula medium to large, sessile. Involucre bracts in 2 rows. Receptacle conical to oblong, with scales and hairs. Outer florets ligulate, sterile; inner florets tubular, gibbous at base and with a shortly 5-lobed limb, hermaphrodite. Achenes obovoid-oblong, subterete; pappus absent.

1. *C. arabicus* (L.) Cass.

African Cladanthus

Puberulent and strong smelling. Leaves 2-3 cm. long, with linear lobes, petiolate, the upper in a whorl, closely subtending the capitula. Primary stem short, 2-6 branches arising immediately below the capitulum, each terminated by a capitulum and again branching. Capitula hemispherical; involucre bracts 7-10 mm. long, ovate-oblong, with a wide scarious appendage; receptacular scales folded round the florets, villous on the inside. Ligules yellow.

Malta: found by Count A. Caruana Gatto in a field along the Mistra to Selmun road in April, 1925 (Borg).

S. Spain; N. Africa.

21. *Anacyclus* L.

Annual or perennial herbs. Leaves (1-)2- to 3-pinnatisect, alternate. Capitula pedunculate, heterogamous. Involucre bracts in few rows, the outer shorter than the inner. Receptacle convex or conical; scales present. Outer florets ligulate,

female or sterile, the ligules entire or minutely 3-dentate, patent or rarely short and erect. Inner florets 5-lobed, yellow; corolla-tube compressed or winged. Achenes compressed, obovate, outer 2-winged, inner often unwinged; pappus absent, or scarious and denticulate, or of distinct scarious scales.

Ligules white; inner involucre bracts without a conspicuous scarious appendage at the apex

1. *clavatus*

Ligules yellow, sometimes purplish beneath; inner involucre bracts with a conspicuous scarious appendage at apex

2. *radiatus*

1. *A. clavatus* (Desf.) Pers.

A. tomentosus DC.

White Anacyclus

More or less villous annual up to 40 cm. high. Leaves oblong or oblanceolate in outline, with linear, mucronulate lobes; petioles flattened and scarious at base. Capitula 15-20 mm. in diameter (excluding ligules). Peduncles clavate after flowering. Involucre bracts lanceolate or ovate-lanceolate, acute or acuminate, without an appendage, greenish with a narrow white or purplish scarious margin, sericeous-villous. Ligules usually 7-14 mm. long, white, oblanceolate, truncate and denticulate at apex, rarely very short. Outer achenes broadly winged; inner achenes unwinged; pappus absent. Fl. 6-7.

Malta: near Luca (by the Poor House) (Borg).

Mediterranean region.

2. *A. radiatus* Loisel.

Plate XLV

Yellow Anacyclus

Like *A. clavatus*, but up to 60 cm. high; peduncles not becoming clavate; involucre bracts oblong, the inner with a large scarious fimbriate appendage at apex; ligules yellow, sometimes purplish beneath; the outer achenes with acute lobes at the top of the wings, the inner very narrowly winged. Fl. 4-6.

Malta: St. George's Bay, Chajm Dwiell (Borg).

Mediterranean region.

22. *Achillea* L.

Perennial herbs. Leaves entire to 3-pinnatifid, alternate. Capitula pedunculate, rarely shortly so. Involucre bracts in few rows, the outer somewhat shorter than the inner, with scarious margins. Receptacle convex or conical; scales present. Outer florets ligulate, female, the ligules more or less 3-dentate, patent or rarely short and erect. Inner florets hermaphrodite, 5-lobed, white, yellow or pink; corolla-tube compressed. Achenes compressed, oblong or obovate; pappus absent.

1. *A. ligustica* All.

Ligurian Yarrow

Stems (30)50-100 cm. high, simple, erect. Middle cauline leaves 2-3 x c. 1.5 cm., ovate in outline, plane, 2-pinnatifid, pubescent, the rhachis somewhat toothed; primary segments lanceolate in outline, irregularly pinnatifid. Corymbs with many capitula. Involucre 2.5-3(-4) x 1.5-2 mm.; bracts appressed-pubescent. Ligules c. 1.5 mm. long, white to pale yellow. $2n = 18$.

Borg states that *A. millefolium* forma *collina* (Becker ex Koch) Borg was widely cultivated and rarely naturalised in Malta and Gozo. This plant now usually regarded as a species, *A. collina* Becker ex Koch, is confined mostly to C. Europe and seems unlikely to have been cultivated in the Maltese Islands. The only specimen seen, collected by E.D. Dickson in the fields of Gozo in 1834 is *A. ligustica* All., and this species is described above. *A. ligustica* is a widespread Mediterranean plant and there is no reason why it should not have been native in the Maltese Islands.

23. *Chamomilla* S.F. Gray

Annual herbs. Leaves alternate, irregularly 2- to 3-pinnatisect, with numerous linear segments. Capitula small to medium, pedunculate or subsessile. Involucral bracts in two or more rows, with a scarious margin. Receptacle conical, hollow, without scales. Ligulate florets, when present, female, white; inner florets tubular, 4 or 5-lobed. Achenes mucilaginous when wet, slightly compressed, obliquely truncate above; dorsal face convex; ventral face with 3-5 narrow whitish longitudinal ribs; pappus absent, or in the form of a small corona or more or less conspicuous auricle.

Ligules present; tubular florets 5-lobed
Ligules absent; tubular florets 4-lobed

1. *recutita*
2. *aurea*

1. *C. recutita* (L.) Rauscheri
Matricaria chamomilla L.
Matricaria recutita L.

Plate XLVI

Kamumilla
Scented Mayweed

Pleasantly aromatic. Stems erect or ascending, much-branched above. Leaves 40-70 mm. long; segments acute, well-separated. Capitula 8-120 (-900); peduncles 3-10 cm. long. Involucral bracts with pale margins. Ligules 6-9 x 2-3 mm., soon deflexed, rarely absent; tubular florets yellow; upper part of tube campanulate above a marked constriction. Achenes c. 1 mm. long, pale greyish-brown, with 4-5 thin ribs on the ventral face; pappus usually very small or absent, but sometimes especially in achenes from the ligulate florets, forming a conspicuous, irregularly toothed auricle which may equal or exceed the achene. $2n = 18$. Fl. 3-5.

Malta and Gozo: weed in old gardens and waste places, but not common; formally cultivated for medicinal purposes (S. & C.G.; Borg); Addolorata cemetery (Gauci).

Most of Europe; W. & C. Asia; introduced elsewhere.

2. *C. aurea* (Loefl.) Gay ex Cosson & Kralik

Golden Mayweed

Stems 4-25 cm. high, slender, decumbent or ascending, and often flexuous, branched from the base, glabrous below, sometimes very sparsely pubescent below the capitulum. Leaves 5-25 x 3-10 mm.; segments numerous, capillary, mucronulate. Capitula 1-60, 4-7 mm. in diameter; peduncles 5-25 mm. long. Florets all tubular, 7-9 mm. (slightly exceeding the auricle if present). Achene 0.6-0.9 x 0.15-0.2 mm. (excluding auricle), pale to dark brown, with 3-5 thin ribs on the ventral face; pappus either a short membranous rim or a conspicuous irregularly toothed scarious auricle 0.6-0.8 mm. long. $2n = 18$. Fl. 3-5.

Malta: rare at Porte de Bombes, Floriana (S. & C.G.; Borg). Gozo: bastions of Victoria (S. & C.G.); Gran Castello (Borg).

Mediterranean region, local; W. & C. Asia.

24. *Chrysanthemum* L.

Annual herbs. Leaves spirally arranged. Inflorescence of solitary capitula at the end of branches. Involucral bracts in several, imbricate rows. Receptacle flat or slightly convex, naked. Ray florets ligulate, female; disk florets tubular, herma-

phrodite, all fertile. Achenes of 2 kinds; those of the ray florets with 2-3 often winged angles, those of disk florets cylindrical, all ribbed; pappus a membranous rim or 0; embryo anterior-posterior.

1. *C. segetum* L.

Lellux, Zigland
Corn Daisy, Corn Marigold

Glabrous, glaucous annual. Stems 20-50 cm. high, simple or branched. Leaves 20-80 x 10-20 mm., rather fleshy; lower oblong, coarsely dentate or pinnatifid, narrowed to a winged petiole; upper oblong, dentate or subentire, sessile, semi-amplexicaul. Capitula 35-65 mm. in diameter, solitary on branches, the long peduncles thickened upwards. Involucre 6-10 x 10-20 mm.; bracts broadly ovate, with broad, pale brown, scarious margins. Ray-florets broadly linear, golden yellow, about as long as the involucral bracts, disk-florets golden yellow. Achenes c. 2.5 mm. long. $2n = 18, 36$. Fl. 3-4.

Cultivated places. Malta: rare (G. Lanfranco); as at Wied Inčita, Marsaskala, Kordin, Buskett (S. & C.G.; Borg); Żejtun, Għirgenti, Għajni il-Kbira (Borg). Gozo: more frequent, Ramla (S. & C.G.; Borg); Marsalforn (Haslam); Qala, adur (Gauci).

Probably a native of the Mediterranean region and W. Asia; but established to 70° N. in Europe; introduced elsewhere.

25. *Pinardia* Cass.

Like *Chrysanthemum* but ray achenes with 3 winged angles and disk achenes tetragonous - compressed and winged along the inner angle; all achenes glandular and striate.

1. *P. coronaria* (L.) Less.

Plate XLV

Zigland, Lellux
Crown Daisy

Chrysanthemum coronarium L.

Annual. Stems 20-60 cm. high, branched, very leafy. Leaves 20-60 x 10-35 mm.; lower oblong, 2-pinnatifid, narrowed to the petioles; upper oblong, with acutely dentate lobes. Capitula 30-50 mm. in diameter, solitary at end of branches, on long peduncles thickened towards their apex. Involucre 6-12 x 7-22 mm.; bracts broadly ovate, obtuse, with brownish margin. Ligules usually yellow, sometimes yellowish-white or yellow at base with white or cream at apex. Achenes c. 2.5 mm. long. Fl. 1-6.

Fields and waste places. Malta, Gozo and Comino: very common (S. & C.G.; Borg; G. Lanfranco; Haslam; Wolseley).

Mediterranean region; Atlantic Islands.

26. *Leucanthemum* Miller

Annual or perennial herbs. Leaves spirally arranged. Inflorescence of solitary capitula at the end of long branches. Involucral bracts in several, imbricate rows. Receptacle flat or slightly convex, naked. Ray florets ligulate, female, fertile or sterile; disk florets tubular, hermaphrodite, fertile. Achenes all similar, or those of ray florets compressed, with 10 micropterous ribs, bearing epicarpic, myxogenic glands, with deep valleculae each enclosing a voluminous secretory canal; pappus present or 0; embryo with transverse cotyledons, sac monosporic.

Capitula 25-50 mm. in diameter
 Capitula 50-75 (-100) mm. in diameter

1. *vulgare*
2. *maximum*

1. *L. vulgare* Lam.
Chrysanthemum leucanthemum L.

Oxeye Daisy

Perennial herbs, sparsely hairy or glabrous. Stems 20-70 cm. high, simple or branched. Basal and lower stem leaves up to 50 mm., oblong-obovate to obovate-spathulate, crenate to dentate, with long petioles; upper leaves oblong, obtuse, dentate to pinnatifid, sessile, semi-amplexicaul. Capitula 25-50 mm. in diameter, solitary on long peduncles. Involucre 6-8 x 12-20 mm.; bracts lanceolate to oblong, green with narrow dark scarious margins and tips. Ray-florets long, white; disk-florets yellow. Achenes 2-3 mm. long. Fl. 4-8.

Malta and Gozo: cultivated in gardens and found as an escape on rubbish tips and in other waste places (Borg).

Throughout Europe.

2. *L. maximum* (Ramond) DC.
Chrysanthemum maximum Ramond

Shasta Daisy

Like a large *L. vulgare*, stems 35-75 cm. high; basal and lower cauline leaves up to 250 mm. long, involucre 10-11 x 20-25 mm., and capitula 50-75(-100) mm. in diameter. Fl. 4-8.

Malta and Gozo: cultivated in gardens and found as an escape on rubbish tips and in other waste places (Borg; Wolseley).

Pyrenees.

27. *Tanacetum* L.

Perennial, rarely annual herbs. Leaves spirally arranged. Inflorescence of corymbs. Involucral bracts in several, imbricate rows. Receptacle flat or slightly convex, naked. Florets all hermaphrodite or with female ray florets and hermaphrodite disk florets. Achenes all similar, obconical, with 5-10 ribs projecting little and with no myxogenic cells; pappus a membranous rim; embryo with transverse cotyledons, sac 4-sporic.

1. *T. parthenium* (L.) Schultz Bip.
Chrysanthemum parthenium (L.) Bernh.

Feverfew

Strongly aromatic perennial herb. Stems 25-60 cm. high. Leaves 25-80 x 30-50 mm., lower ovate, pinnate, leaflets ovate, pinnatifid with dentate or lobed segments, long-petiolate; upper less divided and with shorter petioles. Capitula 12-22 mm. in diameter, with long peduncles, in lax corymbs. Involucre 4-5 x 6-10 mm.; bracts lanceolate to oblong, bluntly keeled, downy, with narrow, pale scarious margins and laciniate tips. Ray florets white, short and broad; disk-florets yellow. Achenes c. 1.5 mm. long. $2n = 18$. Fl. 4-8.

Malta and Gozo: cultivated and often found as an escape on rubbish tips and in waste places (Borg).

Probably native in S.E. Europe and S.W. Asia; cultivated elsewhere.

28. *Artemisia* L.

Herbs or small shrubs, frequently aromatic. Leaves alternate. Capitula small, homogamous or heterogamous, usually pendulous, in elongate panicles or capitate

inflorescences, rarely solitary. Involucral bracts in few rows. Receptacle flat to hemispherical, without scales, sometimes hirsute. Florets all tubular. Achenes obovoid, subterete or compressed, smooth, finely striate or 2-ribbed; pappus absent or sometimes a small scarious ring.

1. *A. absinthium* L. Plate XLVI

Assenzio
 Wormwood

Aromatic, more or less sericeous perennial 30-90 cm. high. Leaves 2- to 3-pinnatisect, petiolate; lobes 5-20 x 1-6 mm., usually obtuse. Capitula hemispherical, nodding, in a paniculate inflorescence. Involucre 2-3 mm. long; outer bracts oblong, herbaceous; inner ovate, herbaceous, with a wide scarious margin. Receptacle hairy. Corolla glabrous. $2n = 18$. Fl. 6-9.

Malta and Gozo: originally naturalised in Ta' Braxia Cemetery and neighbourhood, from which it spread to many gardens and occasionally escapes (Borg; Wolseley).

Most of Europe; W. Asia.

(*A. arborescens* L., Woody Wormwood and *A. alba* Turra (*A. camphorata* Vill.). White Wormwood are frequently cultivated and sometimes found in neglected gardens (Borg; Gauci). Both are white-tomentose, aromatic perennials the former with the inner involucral bracts hairy all over, while those of the latter have broad glabrous margins.)

Tribe Senecioneae Cass. Leaves alternate, very rarely opposite, simple or pinnatisect. Capitula with or without ligules; outer florets usually female, the inner hermaphrodite or male; ligules usually yellow. Receptacle without scales. Anthers usually sagittate but not caudate at base. Style branches truncate and papillose at apex, sometimes with a non-stigmatic apex. Pappus of hairs.

29. *Senecio* L.

Herbs or dwarf shrubs with alternate leaves. Leaves not or scarcely sheathing at the base. Capitula in corymbs, more rarely solitary. Involucral bracts in 1-2 rows, the outer when present irregularly inserted at the base of the capitulum. Receptacle flat, without scales. Outer florets usually ligulate and female; inner florets hermaphrodite, tubular. Achenes usually more or less cylindrical, ribbed; pappus usually present, of simple or barbellate (rarely subplumose) hairs.

One of the largest genera in the world, of cosmopolitan distribution.

- | | | |
|---|-----------------------------|----|
| 1. Perennial; leaves densely white-felted beneath | 1. <i>bicolor</i> | 2. |
| Annual; leaves glabrous, pubescent or cottony beneath | | |
| 2. Outer involucral bracts not more than 5; often 0 | 2. <i>gallicus</i> | 3. |
| Outer involucral bracts more than 8 | | |
| 3. Usually prostrate or with ascending branches; leaves often fleshy, basal obovate, dentate; ray-florets usually present | 3. <i>leucanthemifolius</i> | |
| Erect; leaves not fleshy, basal oblong or lanceolate, pinnatifid; ray-florets usually absent | 4. <i>vulgaris</i> | |

1. *S. bicolor* (Willd.) Tod.
S. cineraria DC.

Plate XLVI

Kromb il-bahar
 Silver Ragwort

Dwarf shrub 25-50 (-100) cm. high. Stem much-branched at the base and sometimes also above, stout, densely white-tomentose, with the leaves mostly crowded towards the base of the flowering stems and forming rosettes on the

non-flowering shoots. Leaves 40-150 x 25-70 mm., dentate to pinnate, densely white tomentose, greenish and glabrescent above. Capitula many, 12-15 mm. in diameter, in dense, compressed corymbs. Involucre 5-8 mm. long, outer bracts up to 5, 1-2 mm. long. Ligules 10-13, 3-6 mm. long, yellow. Fl. 3-7.

Rock fissures, walls and cliffs. *Malta*, *Gozo*, *Comino*, *Comineito*, *Scimunett* and *Filija*; common especially near the sea (S. & C.G.; Borg; G. Lanfranco; Haslam; Wolseley); but also inland as at Wied Inčita, Mesta, Wied Qirda (Borg).

W. & C. Mediterranean region; cultivated and naturalised elsewhere.

(*S. jacobaea* L. (Common Ragwort) a tall plant up to 150 cm. high with 12-15 conspicuous yellow ray-florets was recorded by Duthie from Comino, but not accepted by Borg).

2. *S. gallicus* Chaix

Southern Ragwort

Subglabrous or sparsely floccose annual up to 40 cm. high, usually with several branches from the base. Leaves rather thick, more or less pinnatisect, with linear-oblong, patent, remote, entire to pinnatifid segments; basal leaves petiolate; middle and upper cauline sessile, amplexicaul with dentate to lacinate auricles. Inflorescence subcorymbose with few capitula. Capitulum 15-22 mm. in diameter. Involucral bracts 5-7 mm. long, linear-lanceolate, glabrous, concolorous; outer bracts often absent, sometimes 1-6, 1-2 mm. long, grading into few, remote peduncular bracts. Ligules c. 13, c. 8 mm. long, yellow. Achenes 2-2.5 mm. long, shortly subappressed-hairy on ridges. $2n = 20$. Fl. 12-5.

Gozo: near Chambray according to Gulia (Borg).

Mediterranean region extending to France and Bulgaria.

3. *S. leucanthemifolius* Poiret

Coastal Ragwort

Like *S. gallicus* but often very fleshy; basal leaves usually obovate, dentate; cauline leaves variously dissected, often coarsely pinnatifid, with entire to shallowly dentate auricles; involucral bracts often black-tipped; outer bracts several, up to 2 mm. long, usually blackish; ligulate florets sometimes absent (var. *pygmaeus* (DC.) Borg). Fl. 2-4.

Walls and rocky places, usually not far from the sea. *Malta*; rare (G. Lanfranco), as at Ghar Hassan, Fort Manoel (Borg). *Gozo*: Hagra tal-General, Ras San Dimitri, Xlendi (Borg); Dwejra (Borg; Gauci); Ta' Cenč (Borg; Wolseley).

W. & C. Mediterranean region.

4. *S. vulgaris* L.

Kubrita
Haxixa tal-Kanali
Groundsel

Subglabrous or somewhat floccose, rather succulent annual up to 40 cm. high, with weak, irregularly branched stems. Leaves coarsely pinnatifid with distant, obtuse, toothed lobes; basal and lower cauline leaves oblanceolate in outline, shortly petiolate; middle and upper cauline leaves oblong in outline, auriculate-amplexicaul. Capitula numerous, 4-5 mm. in diameter, subsessile in dense, subcorymbose clusters at anthesis; peduncles elongating in fruit. Involucre cylindrical; bracts 5-8 mm. long, usually glabrous and often black-tipped; outer bracts 8-10, 1-2 mm. long, usually black-tipped, sometimes blackish throughout. Ligules usually absent, sometimes 6-12, yellow.

Achenes 1.5-2(-2.5) mm. long, appressed hairy between the ribs. $2n = 40$. Fl. 12-5. Cultivated and disturbed ground. *Malta*, *Gozo* and *Comino*; common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Throughout Europe except the extreme north; Asia; N. Africa; introduced elsewhere.

Tribe Calenduleae Cass. Leaves alternate, simple. Capitula with ligules; outer florets female, the inner hermaphrodite or male; corolla yellow or orange. Receptacle without scales. Anthers sagittate but not caudate at base. Style of female and male flowers undivided, the style-branches of the hermaphrodite flowers flattened, truncate and papillose at apex. Pappus absent.

30. *Calendula* L.

Annual or perennial herbs, sometimes woody at base, often glandular and aromatic. Leaves alternate, simple. Inflorescence branched or unbranched. Involucral bracts in 1-2 rows, linear, acuminate, subequal, with narrow scarious margins. Receptacle flat, without scales. Capitula heterogamous, radiate. Outer florets ligulate, yellow or orange, female, fertile. Inner florets tubular, yellow, orange, brown or violet-purple; functionally male and sterile. Anthers sagittate-caudate; filaments free. Outer achenes narrowly beaked, and/or cymbiform, or 3-winged (tripteroid) the inner smaller, strongly falcate or almost annulate, tuberculate-rugose on the dorsal surface, usually unwinged; pappus absent.

1. Ligules usually less than twice as long as involucral bracts; rarely more than 18 mm. long; annual
Ligules usually twice as long as involucral bracts, frequently more than 18 mm. long

3. *arvensis*

2.

2. Perennial, sometimes suffruticose; florets normally concolorous; outer (beaked) achenes often very long, spreading or loosely incurved
Annual or biennial, or if perennial woody only at base; florets concolorous or tubular, brownish; outer achenes usually strongly incurved

1. *suffruticosa*

2. *officinalis*

1. *C. suffruticosa* Vahl

Saffejra
Woody Marigold

Stems 20-50 cm. high or more, usually woody for some distance above base, erect, ascending, diffuse or decumbent. Leaves (15-)25-70(-120) x (3-)8-30(-40) mm., linear-lanceolate, oblanceolate, obovate or spatulate, glandular-pubescent or floccose-tomentose, usually repand-dentate, occasionally subentire, the lower tapering to a slender base, the median sometimes amplexicaul, the upper reduced rather suddenly to small, subulate bracts or remaining large and leaf-like. Inflorescence often not much branched, sometimes elongate and rather bare. Capitula 2-5(-6) cm. in diameter. Ligulate florets often 20 mm. long, usually more than twice as long as the involucral bracts, yellow or orange; tubular florets more or less concolorous with ligules. Fruiting capitula with an outer row of patent (occasionally deflexed) or loosely incurved, narrowly beaked achenes up to 30 mm. long, alternating with much shorter cymbiform or (rarely) tripteroid achenes. Fl. 9-6.

(Very variable. At least three subspecies seem to occur. Subsp. *suffruticosa* (*C. officinalis* var. *sicula* sensu Borg) has the stems usually erect; leaves linear-lanceolate to narrowly oblanceolate, acuminate, often conspicuously repand-dentate,

green, glandular-pubescent; capitula 30-40 mm. in diameter; outer (beaked) achenes about 30 mm. long, almost straight, patent or deflexed. Subsp. *fulgida* (Rafin.) Ohle (*C. officinalis* var. *fulgida* (Rafin.) Borg) has the stems erect or diffuse; leaves sometimes thinly arachnoid-floccose, especially at margins, undulate or repand-dentate; capitula 25-60 (-60) mm. in diameter; ligules orange, sometimes red at apex; outer achenes usually long-beaked, loosely incurved, glabrous or subglabrous. Var. *melitensis* Sommer & Caruana Gatto is either synonymous with subsp. *fulgida* or intermediate between it and subsp. *suffruticosa*. Subsp. *maritima* (Guss.) Meikle (*C. officinalis* var. *maritima* (Guss.) Borg) has the stems procumbent or decumbent, leafy; leaves densely and conspicuously glandular-pubescent, rather thick and fleshy, entire or rarely sparingly denticulate; capitula 30-40 (-50) mm. in diameter; ligules yellow or rarely orange; outer achenes usually shortly rostrate, rather closely incurved, scabrid-pubescent.)

Valleys, walls, and rocky, stony, sandy and waste places. *Malta*, *Gozo* and *Comino*: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region.

2. *C. officinalis* L.
includ. var. *hortensis* Fiori

Pot Marigold

Annual, biennial or sometimes perennating, but if perennial woody only at the base. Stems (17-)20-50 (-70) cm. high, erect, diffuse or procumbent, much branched, generally leafy almost to apex. Leaves (30-)70-140 (-170) x (10-)15-40 (-60) mm., oblanceolate, narrowly obovate, oblong or spatulate, shortly acute or obtuse, glandular-pubescent or sometimes thinly arachnoid-floccose, usually subentire or undulate, occasionally remotely and often obscurely repand-dentate, the lower tapering to a slender base, the median and upper often broadly amplexicaul. Inflorescence repeatedly divided, often with large leaf-like bracts; peduncles usually short. Capitula (20-)25-50 (-70) mm. in diameter. Ligules often 20 mm. long, twice as long as, or more than twice as long as involucre bracts, yellow or orange; tubular florets usually more or less concolorous with ligules, sometimes brown. Fruiting capitula with or without an outer row of incurved (or rarely patent) narrowly beaked achenes 20-50 mm. long, alternating with much shorter, cymbiform or (rarely) tripteroid achenes. Fl. 1-6.

Cultivated and often found on rubbish heaps and in waste places. *Malta* and *Gozo*: frequent (Borg; Haslam; Wolseley).

Widely cultivated; origin unknown.

(*C. stellata* Cav. which differs from *C. officinalis* in having the ligulate florets violet at apex, tubular florets violet-purple; outer achenes patent, beaked, or sometimes with wide, coarsely wings, is almost certainly to be found in the Maltese Islands).

3. *C. arvensis* L.

Plate XLVI

Suffeja tar-raba
Field Marigold

Very variable annual. Stems (5-)15-25 (-30) cm. high, often thinly arachnoid-floccose, erect or diffuse, usually much branched. Leaves (10-)30-80 (-100) x (4-)5-14 (-20) mm., pubescent or thinly floccose, oblong or narrowly obovate, acute or obtuse, with subentire or obscurely denticulate margins. Capitula 10-20 mm. in diameter. Ligules yellow or orange, usually less than 18 mm. long, often distinctly exceeding, but not twice as long as involucre bracts. Tubular florets concolorous with ligules or sometimes brown or violet-purple. Fruiting capitula

usually with an outer row of incurved, narrowly beaked achenes 13-20 mm. long, alternating with broadly cymbiform achenes 6-10 mm. long, the beaked achenes occasionally very long (up to 25 mm.) and conspicuous or rarely wholly replaced by cymbiform achenes or annulate achenes. Fl. 10-5.

Cultivated and waste places. *Malta*, *Gozo* and *Comino*: common (S. & C.G.; Borg; G. Lanfranco; Haslam; Wolseley).

Mediterranean region north to C. Europe; W. & C. Asia.

Tribe Cardueae Hoffm. Leaves alternate, entire or pinnatifid, often spiny. Capitula usually without ligules; florets all hermaphrodite or the outermost female or neuter; corolla purple or yellow. Receptacle without scales, but often hairy. Anthers usually caudate at base. Styles with a ring of hairs or a swelling below the bifurcation of the branches. Pappus of hairs or scales.

31. *Carduus* L.

Annual to perennial herbs with spiny-winged stems. Leaves spiny-dentate, subentire to pinnatisect. Capitula many-flowered, depressed-globose to cylindrical. Involucre glabrous to densely arachnoid-hairy; bracts in many (rarely few) rows, more or less imbricate, spine-tipped. Receptacle densely rigid-hairy. Florets purple, rarely pink or white; corolla with slender tube and equally lobed limb or unequally lobed with one lobe longer than the others. Anthers sagittate, with slender, entire or lacerate tails. Achenes 3-10 mm. long, glabrous, shiny or dull, smooth or with 5-10 ribs; pappus of many rows of unequal rigid hairs, the inner longest, all united at base into a ring.

Apical spines of teeth on stem wings up to 5 mm. long;
corolla 15-17 mm. long

1. *pycnocephalus*

Apical spines of teeth on stem wings up to 12 mm. long;
corolla 10-12 mm. long

2. *arabicus*

1. *C. pycnocephalus* L.
including var. *brevisquomus* (Fiori)
var. *temiflorus* (Curt.)

Plate XLVI

Xewk tal-fura zghira
Plymouth Thistle

Annual herb. Stem up to 80 cm. high, with stout ribs, arachnoid-hairy but grey-tomentose distally; winged, the wings with triangular teeth up to 5 mm. wide with an apical spine up to 5 mm. long and 1-2 lateral pairs of spinules set at 45°. Leaves soft, sparsely hairy above, greyish-arachnoid beneath with mostly unicellular hairs; middle cauline oblanceolate to oblong-lanceolate, lobed for up to $\frac{1}{2}$ of way to midrib, cauline oblanceolate to oblong-lanceolate, lobed for up to $\frac{1}{4}$ of way to midrib, with 2-5 pairs of palmate lobes each with an apical spine up to 12 mm. long, with the veins raised in the distal half; petioles of lower leaves up to $\frac{1}{2}$ as long as lamina. Capitula 15-20 x 7-13 mm., cylindrical, solitary or 2-3 together at ends of branches, subsessile or peduncles up to 100 x 20 mm., naked, greyish-tomentose. Involucre arachnoid-hairy; bracts imbricate, tapering into a spinule up to 2 mm. long, the mid-vein raised, minutely verruculose on the back, ciliate; inner bracts up to $1\frac{1}{2}$ times as long as middle, faintly 3-veined in the distal half, acuminate and tapering into a mucro 0.5-1 mm. long, not scarious at margin. Corolla 15-17 mm. long; tube 5-6 mm. long, narrow. Achenes 4-5 mm. long, compressed, smooth; apical prominence small, shortly stalked and clavate, entire. 2n = 62-64. Fl. 3-6.

Roadsides and other waste ground. *Malta*, *Gozo* and *Comino*: common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region extending to Bulgaria.

1. *C. nubius* Jacq. subsp. *marmoratus* (Boiss. & Heldr.) Kazmi
Plate XLVII Horfox
C. marmoratus Boiss. & Heldr. Arabian Thistle

Annual herb. Stem up to 60 cm. high, with both stout and slender ribs, more or less arachnoid-hairy; winged, the wings with triangular teeth up to 8 mm. wide with an apical spine up to 12 mm. long, and lateral spines. Leaves thickish, green and glabrescent above, greyish-arachnoid-hairy beneath with multicellular and unicellular hairs; middle cauline lyrate-pinnatifid for up to 4/5 of way to midrib with 2-5 pairs of triangular lobes, each with a strong apical spine up to 30 mm. long and with a few weaker lateral spines, veins raised beneath. Capitula 15-20 x 5-10 mm., cylindrical, subsessile and mostly 2-5 together at the apex of the stem. Involucral bracts imbricate, usually suberect at apex, 1.5-3 mm. wide, ovate-lanceolate, more or less contracted in a spiny apex; with a terminal spinule 0.5 mm. long, with the mid-vein raised only in the distal 1/4, glabrous or nearly so, minutely serrulate but not scarious at the margin; inner bracts 1 1/4 times as long as the inner middle bracts, veinless, acuminate, with scarious margins. Corolla 10-12 mm. long; tube 4-5 mm. long, narrow. Achenes 4-5 mm. long, smooth, apical prominence absent; pappus 10-13 mm. long. Fl. 3-6.

Roadsides and other waste places. *Malta*, *Gozo* and *Comino*: very common (Borg; G. Lanfranco; Wolseley).

C. & E. Mediterranean region.

32. *Galactites* Moench

White-tomentose, annual herbs. Leaves alternate, white-veined or variegated above, white tomentose beneath, with spiny lobes or teeth. Capitula solitary or in corymbose cymes or clusters at ends of branches. Involucre ovoid; bracts imbricate, the outer and middle terminating in a rigid, erecto-patent spine. Receptacle densely hairy. Inner florets small, tubular, hermaphrodite; outer florets much enlarged, infundibuliform, sterile. Corolla purple to white. Achenes subcylindrical, striate, glabrous; pappus of white plumose hairs.

1. *G. tomentosa* Moench Plate XLVII Xewk abjad
Lupia galactites (L.) O. Kuntze Mediterranean Thistle

Stems (8-)15-60 cm. high. Basal leaves oblanceolate, serrate, petiolate, soon decaying; cauline leaves 40-180 x 10-80 mm., pinnatifid, rarely undivided, sessile and shortly decurrent, the spines 1.5-6(-8) mm. long. Capitula pedunculate, solitary or in a corymbose cyme; involucre 10-15 mm. long, arachnoid-pubescent, the bracts with greenish spines 5-10 x 0.3-0.5 mm. Achenes 3.5 x 1-1.5 mm., yellowish; pappus 3 to 4 times as long as the achene. $2n = 22$. Fl. 3-6 (rarely in winter).

Waste and cultivated places. *Malta*, *Gozo* and *Comino*: very common (S. & C.G.; Borg; G. Lanfranco; Haslam; Wolseley).

Mediterranean region; S.W. Europe; Atlantic Islands.

33. *Notobasis* Cass.

Spiny annuals. Leaves alternate, white-veined above, grey arachnoid-pubescent beneath, with spinulose margins and spinose segments. Involucral bracts imbricate, with a vitta and a very short apical spine. Florets hermaphrodite, purple, rarely white. Anthers with basal appendages c. 0.3 mm. long. Achenes obliquely obovoid-globose, compressed, smooth, woody, with indistinctly marginate, truncate apex; pappus of numerous outer rigid plumose hairs and an inner ring of short hairs connate at base.

1. *N. syriaca* (L.) Cass. Plate XLVI
Cirsium syriacum (L.) Gaertner

Xewk tax-Xitan
Horse Thistle

Stems 20-60(-180) cm. high, usually branched and bluish above. Basal leaves herbaceous, elliptical, dentate to lobed, petiolate; cauline coriaceous, lanceolate to oblong-lanceolate, pinnatifid, broadly auriculate-amplexicaul, the uppermost rigid, pinnatisect, nearly reduced to strong spines, surrounding and exceeding the capitula. Capitula in elongate clusters or solitary. Involucre 17-23 x 15-25 mm. Achenes c. 7 mm. long, pale brown; outer pappus hairs rigid, 13-15 mm. long, the inner 1-2 mm. long. $2n = 34$. Fl. 1-5.

By paths and roadsides and in waste places. *Malta*: common (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Gozo*: Sannat, Wied il-Lunzjata (S. & C.G.; Borg); Xlendi, Qbajjar (Borg).

Mediterranean region; S.W. Asia; Atlantic Islands.

34. *Onopordum* L.

Biennial herbs. Stems spiny-winged, or absent. Leaves dentate, pinnatifid to pinnatisect, rarely subentire. Capitula globose to ovoid. Involucral bracts in several rows, coriaceous, densely imbricate at least near the base, spine-tipped, glabrous to puberulent, sometimes glandular. Receptacle glabrous, pitted, the pit deep with dentate margins. Florets reddish-purple, rarely pink or white; corolla-tube slender; limb actinomorphic or saccate. Anthers with subulate apical appendages. Achenes 4-6 mm. long, subtrigonal, 4- to 5-ribbed, glabrous, dull; pappus of scabrid or plumose hairs united into a ring at base, deciduous.

1. *O. argolicum* Boiss. Plate XLVII Argolian Cotton Thistle
O. sibthorpiannum sensu Borg, non Boiss. & Heldr.

Plant up to 150 cm. high, with multicellular hairs, more or less viscid. Stem brownish, sparsely hairy, densely and minutely glandular in the grooves; wings up to 8 mm. wide, subpalmate, with raised, somewhat reticulate yellowish veins beneath, tapering into a spine up to 5 mm. long. Capitula 40-60 x 60-80 mm., subglobose, densely arachnoid-hairy; involucral bracts 35-45 mm. long, 5-7 mm. wide at base, tapering to a coriaceous, semicylindrical, patent or deflexed process. Corolla 25-30 mm. long. Achenes 4-5 mm. long, brownish-grey; pappus 8-10 mm. long. Fl. 3-6.

Dry and waste places. *Malta*: infrequent (G. Lanfranco); as at Mdina, Mosta, St. Paul's Bay, Mtahleb, Mellieha, Msida (S. & C.G.; Borg); Ghajn Tuffieha, Ghajn Znuber (Borg); Bahrija; Fort San Leonardo (Gauci). *Gozo*: Sannat, Mgarr ix-Xini (S. & C.G.; Borg); Ramla (Borg). *Comino*: (Borg).

C. & E. Mediterranean region.

35. *Cynara* L.

Perennial herbs; stem erect, striate to ribbed, sometimes absent. Leaves in a basal rosette or alternate, usually deeply divided and with spiny segments. Capitula solitary or in a little-branched, corymbose cyme. Involucre ovoid to globose; bracts imbricate, glabrous, the outer and middle with a stout spine or an ogate to triangular appendage at the apex. Receptacle fleshy, the scales setaceous, Florets all hermaphrodite. Corolla purplish, blue or white, tubular, 5-fid; style long-exserted. Achenes obpyramidal or obovoid-cylindrical, glabrous; pappus multiseriate, the hairs connate at the base, plumose, dirty white.

Leaf-segments spiny; involucral bracts with apical spine or spiny appendage

1. *cardunculus*

Leaf-segments unarmed or mucronulate; involueral bracts with large, cuspidate, apical appendage

2. scolymus

1. *C. cardunculus* L.

Plate XLVII

Qaqoë tax-Xewk
Cardoon

Stems 20-100 cm. high, lanate. Leaves up to 50 x 35 cm., subcoriaceous, bright green and shortly tomentose above, white-tomentose beneath; segments ovate to linear-lanceolate, with rigid, yellow spines 15-35 mm. long at apex and clustered at base; lower leaves petiolate, the uppermost sessile. Involucre 45-60 x 40-50 mm., ovoid-globose; bracts ovate to elliptical, gradually or abruptly narrowing into an erecto-patent spine 10-50 x 2-6 mm., glaucescent or purplish. Corolla blue, lilac or whitish. Achenes 6-8 x 3-4 mm., shiny, brown-spotted; pappus 25-40 mm. long. Fl. 3-6.

Stony and waste places. *Malta*, *Gozo* and *Comino*: common (S. & C.G.; Borg); *Marsalforn* (Kramer & Westra).

Mediterranean region; occasionally cultivated elsewhere for the leaves which are blanched and eaten as a vegetable.

2. *C. scolymus* L.

C. cardunculus var. *scolymus* (L.) Mori

Qaqoë
Globe Artichoke

Like *C. cardunculus* but stems up to 200 cm. high, glabrescent; leaves up to 80 x 40 cm., soft, glabrescent above, greyish-tomentose beneath, with wide, unarmed or mucronulate segments; involucre 60-70 x 70-80 mm., the bracts fleshy, with a flattish apical appendage; appendage 15-40 x 12-35 mm., ovate to triangular, truncate, cuspidate or sinuate-truncate.

Malta and *Gozo*: widely cultivated as a vegetable (Borg).

Unknown in a wild state, but probably originally derived from *C. cardunculus* in S.W. Europe or N. Africa; widely cultivated.

36. *Silybum* Adanson

Robust annual or biennial herbs. Leaves alternate, white-veined or variegated, with strongly spiny margins. Capitula solitary. Involucre ovoid; bracts imbricate, the outer and middle with an apical, rigid-hairy to dentate appendage terminating (at least in the middle) in a long spine. Receptacle densely hairy. Florets all hermaphrodite. Corolla purple, deeply 5-fid, with a long tube. Achenes ovoid-oblong, compressed, glabrous; pappus of white scabrid hairs united below into a ring.

1. *S. marianum* (L.) Gaertner

Plate XLVII

Xewk baghli
Milk Thistle

Stems 20-150 cm. high, rarely shorter, glabrous or slightly arachnoid-pubescent. Basal leaves 25-50 x 12-25 cm., pinnatifid, glabrous or glabrescent, petiolate; cauline leaves smaller, less deeply divided, auriculate-amplexicaul, sessile, with yellowish-white spines up to 8 mm. long. Capitula 25-40 mm. in diameter; peduncles long, erect, ebracteate or with few, small, leaf-like bracts; outer and middle involueral bracts with appendages 8-15 x 6-10 mm., gradually tapered into recurved, corniculate spines 20-50 mm. long. Achenes 6-8 x 2.5-4 mm., shiny, black with grey spots; pappus 15-20 mm. long. $2n = 24$. Fl. 4-7.

Waste places, roadsides and occasionally fields. *Malta* and *Gozo*: very common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region; W. and C. Asia; Atlantic Islands; introduced elsewhere.

37. *Crupina* (Pers.) Cass.

Slender, erect, annual herbs, corymbosely branched above. Leaves alternate, unarmed, gradually decreasing upwards, the basal simple, the cauline pinnatisect. Involucre cylindrical to ovoid; involueral bracts imbricate, unequal, oblong-lanceolate, acute. Receptacular scales linear-subulate. Inner florets hermaphrodite, 5-fid; outer florets sterile, 3-fid. Corolla purple. Achenes subcylindrical to compressed, puberulent at base, villous towards apex, dark brown; pappus absent in the outer achenes, 2-serrate in the inner achenes, the outer series with very unequal, minutely scabrid hairs, the inner with 5-10 short scales.

1. *C. crupinastrum* (Moris) Vis.

Plate XLVIII

Southern Crupina

Stems 20-50(-80) cm. high, leafy in the lower $\frac{1}{2}$ to $\frac{1}{3}$. Basal leaves oblong to obovate, entire to pinnatifid, scabrid, petiolate, soon decaying; cauline leaves scabrid, sessile, dentate to pinnatisect with lobes 1.5-3 mm. wide. Involucre 15-20 x 5-10 mm. in flower, bracts pale green, sometimes purplish distally. Achenes 3-4 x 2-2.5 mm., usually compressed, with a linear, sublateral scar; pappus hairs golden brown, the scales oblong, truncate or trifid. $2n = 28$. Fl. 3-5.

Arid places. *Malta*: local (G. Lanfranco), as at Wied Qirda, St. Paul's Bay (S. & C.G.); Kordin (GD; Borg); Buskett, Ta' Laurenti, Pwales, Wied il-Kbir, Bahar lè-Cughaq, Magtab (Borg); Wardija (Gauci).

Mediterranean region; W. Asia.

38. *Centaurea* L.

Annual to perennial herbs, rarely woody. Leaves alternate. Capitula solitary or in clusters. Involueral bracts numerous, usually imbricate, each with a membranous or scarious terminal appendage which is lacinate, ciliate, dentate, pectinate or spiny, rarely entire. Receptacle more or less flat, with rigid hairs. Florets tubular, all similar, hermaphrodite, or more often the marginal florets longer and neuter. Achenes compressed, smooth; pappus of 2-several rows of rigid hairs, sometimes scale-like or absent.

1. Leaves entire, fleshy

1. *crassifolia*

At least some leaves divided into lobes, segments or teeth

2.

2. Florets yellow

3.

Florets not yellow

5.

3. Upper leaves not decurrent

3. *nicaeensis*

Upper leaves decurrent at base

4.

4. Leaves lanate or greyish-tomentose; florets eglandular; pappus twice as long as achene

6. *solstitialis*

Leaves green, crispate-pilose; florets glandular; pappus as long as achene

7. *melitensis*

5. Appendage of involueral bracts with apical spine 10-18 mm. long and usually with 1-3 basal spines

5. *calcitrapa*

Appendage of involucre bracts without spines or with only an apical spine

6. Apical spine of appendage of involucre bract recurved and pinnatisect
Apical spine of appendage of involucre bract if present not recurved or pinnatisect
7. Appendage of involucre bract decurrent; outer florets dark blue (rarely white or purple)
Appendage of involucre bract not decurrent; florets pink or purplish (rarely white)

Sect. *Centaurea*

1. *C. crassifolia* Bertol.

Plate XLVIII

Widnet il-Bahar
Malta Knapweed

Glabrous perennial. Stems up to 50 cm. high, little-branched above. Leaves up to 60 x 15 mm., nearly all basal, undivided, fleshy, oblanceolate-spathulate, entire or denticulate-serrate, shortly petiolate; cauline linear-spathulate. Involucre 20-25 mm. in diameter, ovoid; bracts entire, coriaceous, the middle bracts ovate, obtuse, finely striate. Florets all tubular purple or white. Achenes 6-8 mm. long, transversely rugulose above, glabrous; pappus of 2 equal rows of scabrid, rigid hairs, the inner somewhat scale-like, dilated and connate into an annulus at base, slightly longer than achenes white. Fl. 3-8.

Cliffs. *Malta*: locally frequent (G. Lanfranco); Wied Babu, Fomm ir-Rih (S. & C.G.; Borg; Wolseley); Wied Moqbel (GD; Borg); Wied iz-Zurriq (Duthie; Borg; Wolseley); Gzira and Ghar Lapsi, Dingli Cliffs (Borg; Wolseley); below Hagar Qim (Wolseley). *Gozo*: between Xlendi and Mgarr ix-Xini (Duthie; Borg; Wolseley); north of Dwejra (Wolseley).

Endemic.

Sect. *Cyanus* (Miller) Pers.

2. *C. cyanus* L.

Cornflower

Annual, rarely biennial. Stem 20-80 cm. high, erect, branched. Leaves floccose beneath, glabrescent and green; lower lanceolate, entire, remotely dentate or lyrate pinnatisect with 1-3 linear or lanceolate segments on each side, acute, petiolate; upper linear-lanceolate, entire. Capitula terminal, solitary or rarely in clusters of 2-3. Involucre 12-13 mm. in diameter, ovoid-globose; bracts not imbricate, green, glabrous, the outer and middle triangular-ovate or ovate, the inner linear-lanceolate; appendages narrowly (0.3 mm.) decurrent, brown; fimbriate c. 1 mm. long, silvery. Florets 2, tubular-infundibuliform; inner hermaphrodite bluish-violet; outer sterile, dark blue, rarely white or purple. Achenes 3.5-4 mm. long; pappus 3-4 mm. long, of several rows of hairs, the outer papillose. $2n = 24$ Fl. 4-7.

Presumably casual. *Malta*: Ghajn l-Istas (Silverwood).

E. Mediterranean region; naturalised in cornfields and casual elsewhere.

6.

Sect. *Melanoloma* (Cass.) Dostal

3. *C. pullata* (L.) Cass.

Purple Knapweed

Annual. Stems 5-45 cm. high, leafy up to the capitula, simple or branched, sometimes absent. Leaves hairy, scabrid; basal in a rosette, oblong, sinuately lobate or lyrate, petiolate; cauline pinnatisect or lyrate-pinnatisect, the uppermost pinnately lobed, rarely entire. Capitula 30-50 mm. in diameter, solitary on stems or branches. Involucre 15-18 mm. long, glabrous; bracts ovate-lanceolate, ciliate, pale green, with black, scarious margins and a recurved, pinnatisect apical spine. Florets bluish-purple, rarely white, the outer patent, much longer than the inner. Achenes smooth; pappus in 2 rows, the outer of setaceous scales, the inner of barbed rigid hairs connate at the base. $2n = 22$. Fl. 4-6.

Presumably casual. *Malta*: Hofra il-Kbira near St. Thomas Bay; Birzebbuga road (Gauci).

S.W. Europe.

Sect. *Jucca* S.F. Gray.

4. *C. alba* L.

Pale Knapweed

Biennial or perennial. Stem 10-80 cm. high, erect, rarely ascending from the base, branched from the lower half, rarely simple. Leaves arachnoid-lanate to subglabrous, rarely viscid; lower 1- (2-3)-pinnatisect to lyrate-lobed, rarely undivided, the segments linear to ovate, entire or dentate; middle pinnately divided, rarely undivided, the segments linear, lanceolate or oblong; upper pinnately divided or lobed, the segments linear-filiform to lanceolate; uppermost linear to lanceolate, undivided to 2- to 3-fid. Capitula solitary, numerous. Involucre 8-22 x 6-25 mm., ovoid to globose or ovoid-cylindrical; appendages of bracts orbicular or broadly ovate, not decurrent, concolorous or with a dark-coloured central spot, the margin entire or denticulate or lacerate-fimbriate, the apex with a soft mucro or spine, or mucicous. Florets pink, white or purplish; inner hermaphrodite; outer sterile. Achenes 2.5-4 mm. long, pappus absent or $\frac{1}{2}$ as long to somewhat longer than achene. $2n = 18$. Fl. 4-5.

Malta: Wied il-Ghomor (Delicata; Gulia; Borg).

Mediterranean region.

Sect. *Calcitrapa* (Hill) Pers.

5. *C. calcitrapa* L.

Red Star-thistle

Biennial. Stems 20-100 cm. high, ascending to erect, divaricately branched from the base. Young leaves lanate, becoming greenish, crispate-pubescent, glandular; lower pinnatifid, with lanceolate, acute, remotely serrate lobes, withered at flowering; upper pinnatifid, with linear-lanceolate segments, the uppermost lanceolate or somewhat hastate. Capitula solitary or in clusters, sessile, surrounded by upper leaves. Involucre 6-8 mm. in diameter, ovoid-cylindrical; bracts coriaceous, ovate, indistinctly veined, with scarious margin; appendages with slender, patent apical spine 10-18 mm. long and usually 1-3 basal spines c. 3.5 mm. long. Florets pale purple, glandular, equal. Achenes c. 3 mm. long; pappus absent. $2n = 20$. Fl. 5-7.

Dry places. *Malta*: St. Paul's Bay (S. & C.G.; Borg); Mosta (Borg); Sta. Lucia (Caruana). *Gozo*: Ta' Cené (Gulia; S. & C.G.; Borg).

S. Europe; N. and Tropical Africa; W. & C. Asia.

6. *C. solstitialis* L.

Yellow Star-thistle

Biennial. Stem 30-100 cm. high, erect, much-branched from lower half, usually greyish-tomentose, the branches long, winged. Leaves scabrid, lanate to greyish-tomentose; lower usually lyrate to pinnatifid, with triangular-oblong lobes; upper linear-lanceolate, entire, mucronate. Capitula solitary. Involucre 7-12 (-15) mm. in diameter, usually ovoid-globose; bracts broadly ovate; appendages short, the apical spine 10-15 (-30) mm. long, the basal spines c. 3 mm. long. Florets usually yellow, eglandular, equal. Achenes c. 2.5 mm. long, black; pappus up to 5 mm. long, of 2 rows of hairs. $2n = 16$. Fl. 6-10.

Dry places. *Malta*: Wied Żnuber (Reade; S. & C.G.; Borg); Kordin, Mtaieb (Borg).

Mediterranean region; C. Europe.

7. *C. melitensis* L.

Malta Star-thistle

Annual or biennial. Stem up to 80 cm. high, erect, winged above, sparingly branched from the middle. Leaves green, crispate-pilose, the margin scabrid; lower lanceolate, lyrate-pinnatifid to sinuate-lobed; upper lanceolate. Capitula solitary or in groups of 2-3. Involucre 8-12 mm. in diameter, ovoid-globose; bracts glabrous or puberulous, veinless; appendages short, with patent apical spine 5-8 mm. long, and 1-3 remote, short lateral spines. Florets yellow, glandular, the outer radiate. Achenes c. 2.5 mm. long; pappus as long as achenes, of 2 rows of hairs. $2n = 24$. Fl. 3-7.

Arid, rocky places. *Malta*: rare (S. & C.G.; G. Lanfranco); as at Buskett, Bugibba, Wied il-Ghasel, San Martin, Wied Inčita, Marfa, Ghajn Tuffieha, Gnejna, Żurrieq (Borg); Wardija (Silverwood); Fomm ir-Rih (Gauci). *Gozo*: frequent at Ta' Cenč, Mgarr ix Xini (Borg). *Comino*: frequent (Borg). *Selmunett*: (Lanfranco; Gauci).

Mediterranean region; Atlantic Islands; introduced elsewhere.

8. *C. nicaeensis* Ait.

Xewk tal-Ghotba
Mediterranean Star-thistle

Biennial. Stem 30-60 cm. high, erect, branched above, not winged. Lower leaves lyrate-pinnatifid; upper oblong, cordate, semiamplexicaul, lobed towards base, not decurrent, the uppermost oblong to lanceolate. Capitula solitary, surrounded by upper leaves. Involucre c. 8 mm. in diameter, ovoid; bracts glabrous; appendages with apical spine 10-15 mm. long and 2-3 short lateral spines. Florets yellow. Achenes 4.5 mm. long; pappus 1-1.5 mm. long, of 2 rows of hairs. Fl. 4-7.

Cultivated and waste places. *Malta* and *Gozo*: common (S. & C.G.; Borg); G. Lanfranco; Wolseley).

W. & C. Mediterranean region.

39. *Carthamus* L.

Usually spiny, branched annuals, rarely small shrubs, with glandular and more or less villous-lanate to arachnoid indumentum. Leaves usually pinnatifid to pinnatisect, with spiny margins. Involucral bracts multiserial, imbricate, spiny, the outer leaf-like, the inner sometimes with apical appendages. Capitula solitary on stems and branches. Florets all hermaphrodite; corolla yellowish or violet to pinkish-purple; filaments usually densely bearded. Achenes obpyramidal, 4-angled, glabrous, the outer usually coarsely rugose, without pappus, the inner more or

less smooth, usually with a persistent, multiserial pappus of rigid hairs or linear scales.

Leaves usually undivided, with entire or spinous-dentate margins; filaments subglabrous; achenes more or less smooth; pappus usually absent

1. *tinctorius*

Leaves more or less divided, spinous-dentate; filaments bearded; at least the outer achenes rugose; the inner with a pappus

2. *lanatus*

1. *C. tinctorius* L.

Ghosfor
Orange Carthamus

Subglabrous annual. Cauline leaves undivided or rarely sinuate to pinnatifid, ovate to lanceolate-ovate, spinous-dentate or entire. Capitula broadly ovoid to conical-ovoid. Inner involucral bracts oblong-lanceolate, entire. Corolla yellow, orange or reddish; filaments subglabrous. Achenes obpyramidal, more or less smooth, shiny, white. Pappus absent or rarely the inner achenes with short bristles. $2n = 24$. Fl. 6-8.

Malta, *Gozo* and *Comino*: commonly cultivated for bird-seed (Borg); recently only found cultivated in *Gozo* (Wolseley) and S.E. *Malta* (Gauci).

Native of W. Asia. Formerly widely cultivated in S., S.E., W. and C. Europe, now less so.

2. *C. lanatus* L. subsp. *baeticus* (Boiss. & Reuter) Nyman.

Plate XLVI

Xewk il-far, Xewk ta' Kristu
Woolly Carthamus

Glandular annual, with more or less lanate-villous arachnoid indumentum. Leaves pinnatifid or pinnatisect, spinous-dentate. Capitula ovoid; inner involucral bracts oblong-lanceolate, with small often inconspicuous, ovate-lanceolate, scarious, dentate to subentire apical appendages. Corolla yellow, rarely paler or whitish. Pappus of narrow, acute, ciliate scales. Fl. 5-7.

Malta and *Gozo*: roadsides and waste places, common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region; subsp. *baeticus* on Mediterranean and Aegean islands. S. Greece and S. Spain.

40. *Carduncellus* Adanson

Perennial herbs, usually spiny, acaulescent or with simple or rarely somewhat branched stems, with more or less lanate to arachnoid indumentum. Basal leaves usually pinnate to lyrate, cauline usually sinuate to dentate, teeth often spinous. Involucral bracts multiserial, imbricate, usually spiny, the outer more or less leaf-like, the inner with semicircular to ovate, lacerate to fimbriate appendages. Florets hermaphrodite; corolla usually blue or purple; filaments bearded. Achenes more or less 4-angled, usually rugose to sulcate at least towards the apex, glabrous; pappus multiserial, the rigid hairs ciliate to plumose, usually connate at the base, usually deciduous.

Acaulescent or with stems not more than 20 cm. high; cauline leaves not more than 6; pappus (3-)4-6 times as long as the achene

1. *pinnatus*

Stems present, usually more than 20 cm. high; cauline leaves 10 or more; pappus usually not more than twice as long as achene

1. *C. pinnatus* (Desf.) DC.

Usually acaulescent. Leaves pinnate, with (8-)11-13(-15) pairs of ovate to lanceolate-ovate, glaucous pinnae, the rachis lanate to arachnoid, otherwise glabrous. Outer involucre bracts appressed, dentate or pinnatifid towards the apex, with margins and apex spiny; as long as or shorter than the inner. Achenes c. 7 mm. long, broadly obpyramidal, rugose, with sharp, somewhat prominent angles, reddish-brown; pappus-hairs reddish-brown, 3-4 times as long as the achene. Fl. 5-6.

Malta: recorded by Gulia (Borg).

West Mediterranean region.

2. *C. coeruleus* (L.) C. Presl

Carthamus coeruleus L.

2. *coeruleus*

Stemless Thistle

Blue Thistle

Stem (5-) 30-60 cm. high, simple, rarely branched, with variable lanate-arachnoid indumentum, sometimes becoming glabrous. Basal and cauline leaves shiny, with simple teeth, or pinnatisect to lyrate, with 6-10 pairs of lobes or teeth, the margins and apex shiny; upper cauline leaves ovate-lanceolate. Involucre bracts short-glandular, with more or less arachnoid indumentum; outer bracts leaf-like, spinous-dentate, as long as, or longer than the inner. Achenes c. 6 mm. long, more or less obpyramidal, inconspicuously angled, narrowed from middle to the base, rugose towards the apex; pappus hairs ciliate, whitish, c. 1.5-2 times as long as the achene, free, persistent. Fl. 5-6.

Chiefly on clay soils. Malta: locally frequent (S. & C.G.; G. Lanfranco); Buskett, Girgenti, St. Paul's Bay, Mdina, Mtaheb, ta' l-Iskirnit near Gnejna (Borg); Wied tal-Isqof, Wied Armla near Chadwick Lakes (Gauci). Gozo: frequent (S. & C.G.).

Mediterranean region.

41. *Carlina* L.

Annual to perennial herbs, sometimes woody at the base. Leaves alternate or basal, entire to deeply pinnatisect, usually with spinose-dentate margins. Capitula sessile to shortly pedunculate, solitary or in cymose, often corymbose inflorescences. Receptacle flat, with scales and sometimes also with rigid hairs, the scales divided at the apex, or almost to the base, into linear segments. Involucre bracts in several rows, the outer usually similar to the upper leaves, the inner entire, scarious, shining, rigid, radiating when dry. Florets all hermaphrodite; corolla 5 lobed; anthers caudate. Achenes oblong, hairy; pappus of a ring of plumose hairs, usually united into groups at the base.

Measurements of the diameter of capitula refer to the florets only and exclude the involucre bracts. Measurements of leaves include the spines.

1. Inner involucre bracts bright or brownish-yellow
Inner involucre bracts reddish-purple or white
2. Inner involucre bracts silvery-white above, white or purplish beneath; florets yellow
Inner involucre bracts reddish-purple on both sides;
florets purplish-pink

1. *corymbosa*

2.

2. *sicula*

3. *lanata*

1. *C. corymbosa* L.

C. involucreata auct. eur.

Sajjun

Clustered Carlina Thistle

Very variable. Subglabrous to sparsely arachnoid-tomentose, polycarpic perennial (10-)20-50(-80) cm. high with one or more stems arising from an underground rhizome. Leaves up to 90 x 30 mm., oblong-lanceolate to ovate, dentate to pinnatisect, undulate, with strongly spinose margins. Capitula 12-20 mm. in diameter, solitary on short branches, forming a rather dense corymb. Inner involucre bracts 10-16 x 1.5-2.5 mm., bright or brownish-yellow.

Waste places, walls and rocky valleys. Malta, Gozo and Comino: very common (S. & C.G.; Borg; Wolseley).

Mediterranean region.

2. *C. sicula* Ten.

Sicilian Carlina Thistle

Subglabrous, polycarpic perennial; stem 20-70 cm. high, simple or with very short branches. Leaves c. 70 x 20 mm., oblong, pinnatisect, spinose. Capitula 25-35 mm. in diameter, in a crowded terminal cluster of 2-4; sometimes 1-2 capitula subsessile in leaf-axils lower down. Outer involucre bracts up to 45 mm. long, exceeding the inner; inner bracts 12-15 x 2.5-3 mm., silvery-white above, white or purplish beneath. Florets yellow. Achenes c. 2.5 mm. long; pappus c. 9 mm. long. Fl. 5-8.

Malta: very common (Julia); rare at Wied Lija, Sghajtar near Naxxar (Borg).

S.E. Italy and islands of C. Mediterranean region.

3. *C. lanata* L.

Plate XLVIII

Sebget 'l Ommha

Woolly Carlina Thistle

Annual; stem 10-40 cm. high, simple or sympodially branched. Leaves up to 75 x 25 mm., oblong, pinnatifid, undulate-spinose, persistently tomentose beneath, more or less glabrescent above. Capitula up to 40 mm. in diameter, but often much smaller. Outer involucre bracts 25-40 x 15-20 mm., exceeding the inner; inner bracts c. 12 x 15 mm., reddish-purple on both sides. Florets purplish-pink. Achenes c. 3 mm. long; pappus 12-15 mm. long. Fl. 5-7.

Fallow fields and waste places. Malta and Gozo: common (S. & C.G.; Borg; G. Lanfranco; Haslam; Wolseley).

Mediterranean region.

42. *Atractylis* L.

Annual or rhizomatous perennial herbs. Leaves in a basal rosette, usually also some cauline and alternate, coriaceous, with spiny lobes or teeth. Capitula solitary. Involucre campanulate to subglobose; involucre bracts spiny, imbricate, the outer pectinate-hypinnatisect, the inner entire, scarious and with a slender apical spine. Receptacular bracts lacinate, scarious. Florets all hermaphrodite. Corolla purple or purplish-pink, 5-fid. Achenes cylindrical, sericeous to villous; pappus 1- to 3-seriate; of plumose rigid hairs.

Stems absent; involucre 30-70 mm. long; its outer bracts with 3 patent apical spines much longer than the lateral spines

1. *gummifera*

Stems present; involucre not more than 30 mm. long, its outer bracts with all spines similar

2. cancellata

1. *A. gummiifera* L. Plate XLVII
Carlina gummiifera (L.) Less.

Xewk il-Miskta
Stemless *Atractylis*

Stout perennial; stems absent. Leaves 15-40 x 5-12 cm., oblong-lanceolate in outline, pinnatifid; segments 5-8 pairs, oblong, pinnatifid, acuminate, spinose-dentate; petiole 8-14 cm. long, sheathing at the base. Involucre arachnoid-lanate; outer involucral bracts ligulate, with 3 patent apical spines 10-25 mm. long and much shorter lateral spines; inner bracts somewhat glaucous, with a brown apical spine 3-5 mm. long. Achenes 5-6 x 2.5-3 mm.; pappus 20-25 mm., white. Fl. 9-11(-1). Dry, stony places. *Malta*: Gozo and Comino; very common (S. & C.G.; Borg; G. Lanfranco; Haslam; Wolseley). Mediterranean region.

2. *A. cancellata* L. Common *Atractylis*

Slender annual; stems 3-30 cm. high, white-lanate, glabrescent. Leaves greenish, arachnoid-pubescent; basal up to 50 x 8 mm., oblong-obovate to spatulate, dentate, shortly spiny; cauline up to 30 x 6 mm., oblong-lanceolate, dentate, spiny. Involucre 5-20 x 5-15 mm., surrounded and exceeding to slightly exceeded by upper leaves; outer involucral bracts erect with auriculate-subulate rhachis; middle and inner bracts very unequal, lanceolate, acute, subulate, more or less lanate. Achenes 3-4 x 1.5-2 mm.; pappus 8-10 mm. long, white. Fl. 4-5.

Dry places. *Malta*: local (G. Lanfranco; Wolseley); as at St. Paul's Bay, Manoel Island, Wied Żnuber, Mtaħleb, Wied Inċita, Ġnejna (S. & C.G.; Borg); Wied Moqbel, Selmun (Gulia; C. & C.G.); Pwales, Wied il-Kbir, Kordin (Borg).

Mediterranean region.

43. Echinops L.

Perennial, rarely annual herbs with erect, sulcate stems. Leaves 1- to 2-pinnatifid. Capitula 1-flowered, grouped into 1 or more globose inflorescences with lacinate, basal bracts. Involucral bracts in 3-5 series, with branched or simple, white bristles outside them; inner bracts linear, fimbriate, of intermediate length between the shorter outer and the middle bracts. Florets hermaphrodite; corolla tubular, blue or greyish to white; anthers bluish-grey. Achenes cylindrical, angled, densely hairy; pappus of free to connate, scale-like, rigid hairs.

1. *E. ritro* L. Southern Globe-thistle
E. siculus Strobl

Stem 20-60 cm. high, usually branched, white-tomentose or subglabrous, often with glandular hairs. Leaves elliptical in outline, 1- to 2-pinnatisect, glandular-hairy, with few simple hairs or slightly arachnoid above, white-tomentose beneath, the margins revolute; segments linear to oblong-lanceolate, triangular or oblong, with spines 3-15 mm. long. Inflorescence 35-45 mm. in diameter, bluish. Involucre 12-17 mm. long; bristles slightly shorter than the outer bracts, $\frac{1}{2}$ - $\frac{1}{3}$ as long as involucre; bracts 20-22, long-acuminate, ciliate; outer bracts linear-lanceolate. Corolla blue, rarely white. Pappus hairs rigid, connate in basal half at least. $2n = 32$. Fl. 5-7.

Malta: Kordin (Delicata); Ġirgenti (Borg). *Gozo*: (Gulia).

S. and E. Europe; W. Asia.

Subfam. CICHORIOIDEAE (LIGULIFLORAE).

Latex present; all florets ligulate.

Tribe Cichorieae Less. Leaves all radical or alternate. All florets ligulate, hermaphrodite; ligules usually yellow (often striped red), sometimes blue, red, purple, green or white. Receptacle with or without scales. Anthers acute at base, sometimes caudate. Style branches flattened and stigmatic above, rounded and hairy beneath. Pappus often of rigid hairs, sometimes of scales or a corona, or absent.

44. Scolymus L.

Spinose herbs. Ligules yellow. Achenes dorsally compressed, tightly enclosed in the ovate, slightly winged, adnate, deciduous receptacular scales; pappus 0 or of a few rigid hairs.

1. Leaves and wings of stem with a markedly thickened, white margin; uppermost leaves regularly pectinate-spinose; pappus 0

1. *maculatus*

Leaves and wings of stem without, or with only a slightly thickened, white margin; uppermost leaves irregularly spinose; pappus of a few rigid hairs

2. Involucral bracts sparingly hairy, more or less lanceolate, gradually attenuate to an acute apex; apex of receptacular scales narrowed

2. *hispanicus*

Involucral bracts very hairy, ovate-lanceolate to linear-oblong, at least the outer abruptly contracted to a spinous apex; apex of receptacular scales wide

3. *grandiflorus*

1. *S. maculatus* L.

Xewk isfar (tar-riga bajda)
Spotted Golden-thistle

Annual up to 90 cm. high, nearly glabrous, both the continuous irregularly spinose dentate wings of the stem and the oblong-lanceolate to ovate, sinuate-pinnatifid spinose leaves with markedly thickened white margins; uppermost leaves regularly pectinate-spinose. Inflorescence cymose-subcorymbiform; involucral bracts ovate-lanceolate to lanceolate, acute. Receptacular scales with a wide apex. Achenes obovate, pappus 0. Fl. 6-8.

Valleys and by paths and roadsides. *Malta*: locally frequent (G. Lanfranco), as at Siggiewi, St. Paul's Bay (S. & C.G.; Borg); Mdina (S. & C.G.); Aħrax, Mel-Heħa, Wied Gerżuma, Bahrija, Salini (Borg); Chadwick Lakes (Haslam); Wied il-Għasel (Wolseley); Mgarr (Kramer & Westra). *Gozo*: between Ġgantija and Ramlja (S. & C.G.; Borg); Xagħra, Ġnien Xibla, Nadur, Sannat (Borg). *Comino*: Ramlja Sta. Marija (Borg).

Mediterranean region; Atlantic Islands.

2. *S. hispanicus* L.

Plate XLVIII

Xewk isfar
Common Golden-thistle

Biennial or perennial up to 80 cm. high, more or less hairy, the stem with interrupted spinose-dentate wings. Leaves linear-oblong to ovate, sinuate-pinnatifid, spinose; uppermost very irregularly spinose. Inflorescence cymose-paniculate; in-

involucral bracts more or less lanceolate, gradually attenuate to an acute apex, sparingly hairy; receptacular scales narrowed at apex. Achenes clavate; pappus of a few stiff hairs. Fl. 4-7.

By tracks and in waste places, particularly near the sea. *Malta, Gozo and Comino*: frequent (S. & C.G.; Borg; Lanfranco; Wolseley).

Mediterranean region; Atlantic Islands.

3. *S. grandiflorus* Desf.

Xewk Isfar kbir

Large-flowered Golden Thistle

Perennial up to 40 cm. high, more or less hairy; stem with continuous spinose-dentate wings. Leaves ovate-lanceolate to linear-oblong, pinnatisect, spinose; uppermost sparsely long spinose-dentate. Inflorescence cymose-corymbiform; involucral bracts ovate-lanceolate to linear-oblong, the outer abruptly contracted to a spinose apex, very hairy; receptacular scales with a wide apex. Achenes obovate; pappus of a few stiff hairs. Fl. 5-10.

By paths and waste places, near the sea and inland. *Malta, Gozo and Comino*: locally frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley).

C. Mediterranean region.

45. *Cichorium* L.

Annual to perennial herbs. Stems usually solitary, branched. Leaves runcinate-pinnatifid or dentate. Capitula numerous, terminal and axillary; involucre cylindrical; bracts in 2 rows, the outer shorter. Receptacle more or less flat, without scales. Ligules usually blue. Achenes obovoid, more or less angled, truncate at apex; pappus of 1-2 rows of short obtuse scales.

1. Upper branches sterile and spine-like; involucre 5-8 mm. long
Spine-like branches absent; involucre 11-14 mm. long

3. *spinosum*

2.

2. Peduncles of terminal capitula slightly thickened at apex; pappus-scales $1/10 - \frac{1}{2}$ as long as achenes
Peduncles of terminal capitula strongly thickened; pappus scales $\frac{1}{2} - \frac{1}{3}$ as long as achene

1. *intybus*

2. *endivia*

1. *C. intybus* L.

Cikwejra
Chicory

Glabrous or with subrigid hairs. Perennial with long, stout taproot. Stems 30-120 cm. high, erect, with rigid, patent-ascending branches. Basal leaves 70-300 x 10-120 mm., oblanceolate, runcinate-pinnatifid or dentate shortly petiolate; cauline with fewer teeth or entire, sessile, amplexicaul. Peduncles of terminal capitula slightly thickened at apex. Involucre 11-14 x 4-10 mm.; outer bracts c. 8, broadly lanceolate, patent at apex; inner bracts c. 5, twice as long as the outer and narrowed, erect. Ligules bright blue, rarely pink or white, 3 times as long as involucre. Achenes 2-3 mm. long, irregularly angular, pale brown; pappus-scales $1/10 - \frac{1}{2}$ as long as achene. $2n = 18$. Fl. 5-10.

Cultivated and waste places. *Malta*: locally frequent (S. & C.G.; G. Lanfranco; Haslam; Wolseley); Mriehel Road, Buskett, Mtahleb, Ghajn Rihana (Borg). *Gozo*: scattered (S. & C.G.); Xaghra, Nadur, Xlendi (Borg).

Much of Europe, but doubtfully native in most of the north; W. Asia; N. Africa. Formerly cultivated as a medicinal plant, and more recently as a coffee-substitute and for ornament, and widely naturalised. The cultivated plant is larger in all its parts, with more handsome flowers.

2. *C. endivia* L.

Indivja
Endive

Like *C. intybus* but usually annual or biennial; peduncles of terminal capitula strongly thickened; pappus-scales of larger achenes $\frac{1}{2} - \frac{1}{3}$ as long as achene. $2n = 18$. Fl. 5-10.

Two subspecies occur. Subsp. *endivia* has the stems (30-) 60-120 cm. high; leaves dentate to deeply pinnatifid, nearly glabrous. Subsp. *divaricatum* (Schousboe) P.D. Sell has stems 5-50 cm. high; leaves runcinate-dentate, the basal hairy.

Subsp. *endivia* is widely cultivated (Borg). Subsp. *divaricatum* occurs in cultivated, waste and grassy places. *Malta*: Hagar Qim (S. & C.G.; Borg); Dahar il-Hmar (G.C.); Buskett, Mriehel, Gircanti (Borg); Marsalforn (Kramer & Westra). *Gozo*: Dwojra (S. & C.G.; Borg); Wied il-Lunzjata (Borg).

Subsp. *endivia* is widely cultivated; subsp. *divaricatum* is confined to the Mediterranean region.

3. *C. spinosum* L.

Plate XLVIII

Qanfuda
Spiny Chicory

Dwarf perennial with a woody base. Stems 3.5-18 cm. high, divaricately branched from the base, the upper branches sterile and spine-like. Leaves 20-90 x 2-15 mm., fleshy, runcinate or dentate, glabrous. Capitula mostly in the dichotomies of the stem, subsessile, in groups of 1-4. Involucre 5-8 x 2-3 mm.; outer bracts ovate to broadly elliptical, the inner lanceolate, about 3 times as long as the outer. Ligules blue, rarely pink or white, about twice as long as the involucre. Achenes 1.5-2 mm. long; pappus scales $1/10 - \frac{1}{2}$ as long as achene. Fl. 5-7.

Dry places especially by the coast. *Malta, Gozo and Comino*: very common (S. & C.G.; Borg; G. Lanfranco; Haslam; Wolseley). *Cominotto*: (Duthie; Borg).

Mediterranean region.

46. *Catananche* L.

Annual or perennial herbs. Leaves narrow, appressed-hairy. Capitula 1-5, long-pedunculate; involucral bracts in several rows, scarious except for darker central vein. Receptacle flat, with long filiform scales. Ligules blue or yellow. Achenes oblong, obscurely 5-angled, 5-to 10-ribbed; pappus of 1 row of 5-7, ovate, long-aristate scales.

1. *C. lutea* L.

Plate XLVIII

Yellow Catananche

Annual. Stems 8-40 cm. high, hairy, the hairs mostly appressed. Leaves linear, narrowly oblanceolate-linear or very narrowly elliptical-linear, entire or remotely and shallowly dentate; basal 30-150 mm. long, numerous; cauline remote. Peduncles up to 20 cm. long, mainly ebracteolate, but usually with several sessile capitula at base. Outer involucral bracts ovate, the inner narrow and long-attenuate at apex, much exceeding the outer. Ligules yellow. Fl. 3-5.

Dry places. *Malta*: rare (G. Lanfranco), as at St. Andrews, St. Paul's Bay, Mel-
lieha, Wied Ghomor, Wied il-Kbir, Pwales, Bugibba (S. & C.G.; Borg); St.
Andrews (Borg); Qala hill, Wardija ridge (Gauci).

Mediterranean region.

47. *Hyoseris* L.

Annual or perennial herbs. Leaves pinnately divided, all basal. Scapes several,
each bearing a single capitulum. Involucral bracts in 2 rows, inner much longer
than outer. Receptacle flat, naked. Ligules yellow, outer sometimes with dirty
stripe on outer face, which turns greenish on drying. Marginal achenes compressed;
median compressed, winged; inner terete; pappus of rigid hairs and/or scales.

Scapes 0.5-7 cm. high, often swollen; involucre 7-10 x 3-5
mm.; achenes 7-8 mm. long

1. *scabra*

Scapes 6-36 cm. high, not swollen; involucre 10-15 mm.
long; achenes 8-10 mm. long

2. *radiata*

1. *H. scabra* L.

Plate XLIX

Annual *Hyoseris*

Annual. Leaves 15-80 x 3-14 mm., numerous, patent, narrowly oblanceolate,
obtuse to subacute, pinnately divided into ovate, obtuse or acute, more or less
dentate lobes, narrowed at base to a winged petiole, glabrous or with few hairs,
often mealy. Scapes 0.5-7 cm. high, patent or procumbent, often swollen at the
middle or near the apex, glabrous or mealy. Involucre 7-10 x 3-5 mm.; bracts
usually pale, linear, oblong or lanceolate, more or less obtuse, glabrous or slightly
mealy. Achenes 7-8 mm. long, brown, sometimes minutely puberulent; outer with
pappus of short hairs, inner of pale, narrowly linear-lanceolate scales. Fl. 3-5.

Cultivated and waste places. *Malta*, *Gozo*, *Comino* and *Cominotto*: very common
(S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region.

2. *H. radiata* L.

Plate XLIX

Cikwejra salvagga
Perennial *Hyoseris*

H. lucida auct. eur., non L.

Perennial. Leaves 50-250 x 10-50 mm., numerous, more or less ascending or
erect, more or less oblanceolate, obtuse to acute, pinnately divided into more or
less ovate, often runcinate, sometimes imbricate, more or less dentate lobes,
glabrous, mealy or more or less rigid-hairy (var. *setulosa* Guss.) often long
petiolate. Scapes 6-36 cm. high, erect, usually glabrous or mealy, sometimes with
rigid hairs. Involucre 10-15 x 7-15 mm.; bracts pale or dark, linear or oblong,
obtuse, glabrous or mealy. Achenes 8-10 mm. long, brown, puberulous; pappus of
rigid hairs and linear scales. $2n = 16$. Fl. 2-5.

Grassy, cultivated and waste places. *Malta* and *Gozo*: very common (S. & C.G.;
Borg; G. Lanfranco; Wolseley). *Comino*: (Borg).

Mediterranean region.

This species is often called *Toraxacum* by Maltese botanists.

48. *Hedynois* Miller

Annuals. Stems usually many, branched. Leaves entire to dentate or lobed. Capitula
1-many. Involucral bracts in 2 rows, the outer very small. Receptacle flat, without

scales. Ligules yellow, the outer sometimes with greenish stripe on the outer
face. Achenes more or less cylindrical, often incurved, the outer usually partly
enclosed in involucral bracts; pappus at least of inner achenes of narrow, long-
aristate scales, sometimes also including hairs.

1. *H. cretica* (L.) Dum. Courset

Plate XLIX

Variable *Hyoseris*

H. polymorpha DC. nom. illegit.

H. rhagadioloids (L.) F.W. Schmidt

Plant 3-45 cm. high, more or less hairy. Leaves 5-180 x 2-25 mm., mostly nar-
rowly elliptic or oblanceolate, entire to deeply dentate or lobed, the basal usual-
ly with winged petioles, the cauline usually sessile. Capitula 1-numerous; peduncles
more or less thickened. Involucre 7-10.5 x 3-11 mm.; bracts narrow linear-lanceol-
ate, more or less acute, the inner usually partially enclosing outer achenes and
strongly incurved in fruit. Achenes 5-7.5 mm. long, often narrowed near apex,
with minute rigid hairs; outer achenes incurved. Pappus of outer achenes usually
coroniform, those of inner achenes of narrow, long-aristate scales. Fl. 3-5.

Very variable in size, habit, hairiness, dissection of leaf and thickening of peduncle.
Many variants have been named, but the characters occur in various combinations,
even in the same locality, and there seems to be no variants of any geographical
or ecological significance.

Cultivated, waste and open places. *Malta*, *Gozo*, *Comino* and *Cominotto*: very
common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region; W. Asia; Atlantic Islands.

49. *Rhagadiolus* Scop.

Annuals. Stem usually solitary, branched. Leaves dentate to pinnatifid. Capitula
few to numerous. Involucral bracts in 2 rows, the outer very short, the inner
acrescent and patent in fruit. Receptacle flat, without scales. Ligules yellow.
Achenes narrowly linear-subcylindrical, the inner caducous, the outer enclosed in
the involucral bracts and long-persistent; pappus absent.

1. *R. stellatus* (L.) Gaertner

Plate XLIX

Star *Hyoseris*

Plant 7-40 cm. high, usually hairy throughout. Leaves 25-140 x 10-40 mm., most-
ly oblong-obovate but cauline often ovate, sinuate-dentate to lyrate-pinnatifid,
terminal lobe usually much larger than lateral, the basal petiolate, the cauline
usually smaller and sometimes sessile. Involucre 5-8 x 2.5-3.5 mm. at anthesis,
acrescent in fruit; outer bracts 5, very small, ovate; inner bracts 5, narrowly
linear-lanceolate, sometimes with a row of rigid hairs down their central line.
Outer achenes 10-15 x 1-1.5 mm., curved, forming a characteristic radiating in-
fructescence. $2n = 10$. Fl. 3-5.

Grassy and waste places. *Malta*: rare (G. Lanfranco); Gnejna, Mtabieb, Wied Gar-
zuma (S. & C.G.; Borg); San Martin, Wardija, Ghajn Mula (Borg); Dingli (Wol-
seley); Torri Ghajn Hadid (Silverwood). *Gozo*: between Wied Bingemma and
Wied ir Rihan (S. & C.G.; Borg); Wied il-Ghasel (Penza).

Mediterranean region; W. Asia; Atlantic Islands.

50. *Urospermum* Scop.

Annual herbs. Stems usually 1. Capitula on long peduncles. Involucral bracts 7-8, in 1 series, connate at base, some with pale margins. Receptacular scales 0. Ligules yellow, sometimes with a red stripe on outer face. Achenes beaked; pappus of plumose hairs in 2 rows.

Involucral bracts lanceolate, subacute, softly hairy; pappus pale reddish-brown.
Involucral bracts ovate, long-acuminate, spinulose; pappus white.

1. *U. dalechampii* (L.) Scop. ex F.W. Schmidt

1. *dalechampii*

2. *picroides*

Golden-fleece

Stems 25-40 cm. high, pubescent. Leaves with rigid hairs; lower usually runcinate-pinnatifid, rarely entire, petiole winged; upper lanceolate to ovate, entire to dentate, amplexicaul. Capitula 1-3, on very long peduncles, involucral bracts 15-25 x 2.5-6 mm., lanceolate, subacute, softly hairy. Ligules pale yellow, often with a red stripe on the outer face. Achene bodies with short obtuse projections, oblong, confluent with the narrowly pyramidal beak; pappus pale reddish-brown. Fl. 3-6.

Malta: Wied Balluta and Ta' Xbiez (Delicata; Culia; Borg).

W. Mediterranean region extending to Jugoslavia.

2. *U. picroides* (L.) Scop. ex F.W. Schmidt Plate XLIX Tief xewwielki

Prickly Golden-fleece

Annual. Stems 30-45 cm. high, with long rigid hairs and spinulose projections. Leaves with long rigid hairs or spinulose projections, at least on the veins beneath; lower obovate-oblong; pinnatifid or dentate, petiole winged; upper lanceolate to ovate, long leaves more or less dentate, auriculate-amplexicaul. Capitula 1-9, on long peduncles. Involucral bracts 13-22 x 5-8 mm.; ovate, long-acuminate, with rigid hairs and spinulose projections. Ligules pale yellow. Achene bodies with short obtuse projections, oblong with a swollen apex which is contracted to a slender cylindrical beak; pappus white. Fl. 1-6.

Cultivated and waste places. *Malta*, *Gozo*, *Comino* and *Filfa*: common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region; Atlantic Islands.

51. *Hypochoeris* L.

Annual or perennial scapose herbs with a taproot. Leaves all or almost all in a basal rosette, dentate to pinnatifid. Scape sometimes markedly swollen above. Capitula solitary at the apex of scape or scape-branches. Involucral bracts in 1 to several rows. Receptacle flat; scales conspicuous, as long as or longer than the involucral bracts, scarious, 1-veined, long-acuminate. Florets yellow. Achenes usually long-beaked, fusiform, sometimes unbeaked, narrowly oblong, truncate; pappus white, of long rigid plumose hairs in 1 or 2 rows, or the outer of short rigid hairs.

Involucral bracts in 1 row, sometimes with outer supplementary bracts; achenes similar; pappus in 2 rows, the outer of minute rigid hairs, the inner of c. 10 scabrid rigid plumose hairs.

1. *achyrophorus*

Involucral bracts in several rows; achenes of 2 kinds, the marginal 5.5-6 mm. long with short beak and pappus of a chaffy corona of fimbriate, triangular-dilated scales or long plumose rigid hairs, the inner 7.5-10 mm. long, fusiform, long attenuate to beak with c. 20 rigid plumose hairs.

2. *cretensis*

1. *H. achyrophorus* L.
Seriola aetnensis L.
H. aetnensis (L.) Ball

Plate LI

Zigland Zghir
Mediterranean Catsear.

Annual from a short, vertical, slender taproot. Leaves all or almost all in basal rosette, 30-180 mm. long, spathulate, oblanceolate or obovate, entire to deeply dentate or lobed (but not pinnatifid), sparsely hirsute to densely hispid, glaucescent, gradually tapering into the petiole; cauline leaves 1-several, similar to but smaller than basal, or reduced to remote, linear scales. Scapes several, 8-35 (-60) cm. high, procumbent to erect, not thickened at apex, branched (rarely simple), with rigid hairs throughout or only above. Capitula cylindrical to campanulate. Involucral bracts up to 14 x 2 mm., in 1 row or with a few supplementary at base sometimes giving the appearance of several rows, subequal to unequal, oblong to linear-lanceolate, acuminate, densely hispid. Ligules 1½ - 2 times as long as the involucre, golden- or orange-yellow, marginal sometimes with brownish-red on outer face. Achenes 4.5-6.5 mm. long (including beak), all beaked, fusiform, scabrid, castaneous, subequal or the marginal somewhat shorter; pappus in 2 rows, the outer of minute rigid hairs c. 0.5 mm. long, the inner of c. 10, scabrid, rigid plumose hairs 4-6 mm. long, narrowly dilated at base. $2n = 12$. Fl. 4-5.

Waste places. *Malta*, *Gozo* and *Comino*: very common (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Cominotto*: (Duthie).

Mediterranean region; W. Asia.

2. *H. cretensis* (L.) Chaub. & Bory
Seriola cretensis L.

Southern Catsear

Perennial with a long, vertical, thick taproot. Stems solitary to numerous, 10-85 cm. high, glabrous to sparsely hairy. Leaves mostly in a basal rosette, 50-210 mm. long, spathulate, elliptical or oblanceolate, runcinate to pinnatifid (rarely sinuate-dentate), glabrous to rigid hairy, gradually narrowed into the petiole; lower cauline several, smaller, pinnatifid with narrow segments; upper cauline linear; uppermost cauline bracteiform. Capitula campanulate; peduncles somewhat thickened at apex. Involucral bracts up to 15 x 1.5 mm., in several rows, unequal, oblong-lanceolate, acute to acuminate, subglabrous, tomentose, or the keel with rigid hairs. Florets 1½ - 2 times as long as the involucre, yellow, sometimes greyish on outer face. Achenes castaneous; glabrous, with scabrid beak; marginal 5.5-6 mm., oblong, abruptly narrowed into a short beak, the pappus a chaffy corona of fimbriate, triangular-dilated scales c. 0.5 mm. long or of long, rigid plumose hairs in one row; inner 7.5-10 mm. long, fusiform, more slender than the marginal, long attenuate to beak, the pappus a single row of c. 20 scabrid, rigid plumose hairs, not dilated at base. $2n = 6$. Fl. 4-6.

Grassy places and rocks. *Malta*: (D'Ury, G.D.; Guila); Salini (Forsk.). *Gozo*: Xlendi (S. & C.G.); Bugibba, Bahar ic-Caghaq (Borg).

Mediterranean region.

52. *Leontodon* L.

Annual to perennial herbs. Stems 1 to numerous, scapose, sometimes branched, with 10-numerous bracts. Leaves all basal, entire to deeply pinnatifid. Capitula 1-7(-80). Involucral bracts in several, imbricate rows. Receptacle pitted, the pits often with dentate or ciliate margins, without scales. Ligules yellow, the outer often with a reddish or greyish stripe on the outer face. Achenes more or less cylindrical, sometimes beaked, longitudinally ribbed, with numerous muricate transverse ridges; pappus of 1-2 rows of (10-) 14-40 plumose hairs, the outer row sometimes simple; marginal achenes sometimes without pappus or with a pappus of short scales.

1. *L. tuberosus* L.

Plate XLIX

Zigland
Tuberous Hawkbit

Perennial with long, slender tubers. Plant with few to numerous simple and forked hairs throughout. Stems 1-3, 7-35 cm. high, scapose, sometimes with a linear bract. Leaves usually numerous, 20-140 x 5-21 mm., obovate, oblanceolate or oblanceolate-oblong, obtuse to subacute, retrorse-dentate to runcinate-pinnatifid; petioles short or long, winged, sometimes dentate or lobed. Capitulum solitary. Involucre 9-15 x 6-10 mm.; bracts oblong, narrowed to an obtuse apex, hairs when present often confined to a median line. Ligules yellow, the outer with a greenish stripe on the outer face. Achenes 3-7 mm. long, transversely muricate, of 2 kinds; outer curved, beakless or with a short beak and with a pappus of hairs up to 0.5 mm. long; inner usually straight, beaked, the pappus with outer hairs plumose. Fl. 9-3.

Waste and open places. *Malta, Gozo and Comino*: common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region.

53. *Picris* L.

Annual to perennial herbs with rigid hairs, most of which have 2-4 small, hooked branches at the apex, sometimes also with spines. Stems usually solitary, usually branched. Leaves sinuate-dentate to pinnatisect; cauline often more or less amplexicaul. Capitula few to numerous. Involucral bracts in several imbricate rows. Receptacle pitted, without scales. Ligules yellow, the outer often with a reddish stripe on outer face. Achenes transversely muricate between the ribs, usually narrowed at the apex or beaked; pappus of 2 rows of deciduous hairs, the inner always plumose, the outer plumose or simple, the outer achenes rarely with short scarious pappus.

Outer involucral bracts ovate to ovate-lanceolate, broader than the inner; achenes with long beak
Outer involucral bracts linear-lanceolate to narrowly lanceolate, similar to the inner; achenes without or with very short beak

1. *echioides*

2. *hieracioides*

1. *P. echioides* L.

Plate XLIX

Helminthia echioides (L.) Gaertner

Bristly Oxtongue

Annual or biennial. Stems 30-90 cm. high, with rigid, often tubercle-based hairs and often with some slender spines. Leaves with numerous, unequal, rigid

hairs, the larger thickened at the base or tubercle-based, and often with scattered spines; basal 35-250 x 15-100 mm., elliptical to oblanceolate or oblong-oblanceolate, obtuse to acute, sinuate to dentate, narrowed at base into a winged petiole; lower cauline similar to basal but with semamplexicaul petioles, the upper lanceolate to ovate, sessile, amplexicaul. Capitula numerous. Involucre 12-20 x 10-15 mm.; outer bracts broadly ovate, cordate, acuminate, the inner lanceolate, with pectinate-ciliate margins. Achenes 4.5-7 mm. long, transversely muricate, with beak about as long as the remainder of the achene, the inner reddish-brown, more or less straight, the outer whitish, curved. $2n = 10$. Fl. 3-8.

Cultivated and waste places. *Malta, Gozo and Comino*: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley).

S., C. and W. Europe; N. Africa; Atlantic Islands and S.W. Asia; introduced elsewhere.

2. *P. hieracioides* L.

Hawkweed Oxtongue

Biennial to perennial. Stems 15-100 cm. high, with few to numerous, unequal, rigid hairs. Leaves with few to numerous, more or less rigid hairs; basal and lower cauline 60-140 x 10-50 mm., lanceolate, ovate, narrowly elliptical or oblong, obtuse to acute, entire to dentate, narrowed into petiole; middle and upper cauline similar but smaller, sessile, more or less amplexicaul. Capitula few to numerous. Involucral bracts lanceolate to narrowly elliptical, obtuse to acute, the outer about half as long as the inner. Achenes 3-6 mm. long, reddish-brown, weakly transversely muricate, shortly beaked. $2n = 10$. Fl. 5-7.

(The *Malta* plant was said to be subsp. *spinulosa* (Bortol.) Arcangeli with capitula crowded at apex of stems on very short peduncles, the lateral capitula often sessile or nearly so).

Malta: recorded by *Delicata* and *Gulja* (Borg).

Throughout much of Europe except the north; W. & C. Asia.

54. *Thlaspi* L.

Herbs with copious latex and linear or linear-lanceolate, entire, long-acute, sheathing leaves. Capitula large, yellow or purple. Involucre of 1 row of large bracts united at base. Receptacle flat and naked or pitted with scales. Achenes fusiform, 5- to 10-ribbed, beak long; pappus of most of achenes of plumose interwoven hairs.

All achenes with numerous mostly plumose hairs
Outer achenes with only 5 simple hairs

1. *perfoliatus*
2. *lybrius*

1. *T. perfoliatus* L.

Glabrous, more or less glaucous annual or biennial 40-120 cm. high with an irregularly cylindrical taproot. Basal leaves linear-lanceolate, tapered to an acute apex; cauline similar but abruptly narrowed to a long acuminate. Capitula on peduncles conspicuously enlarged near their apex. Involucre 30-60 x 15-30 mm.; usually of 8 bracts. Ligules purple, varying from half as long as to as long as the involucre. Receptacle flat, naked. Achenes 6-10 mm. long, faintly 10 ribbed, gradually narrowed into a beak somewhat exceeding the body; pappus of 1 row of hairs simple below and plumose above except for 3 which exceed the remainder and are simple throughout. $2n = 12$. Fl. 4-5.

Malta: recorded by Delicata and Gulia (Borg); occasionally cultivated (Borg).
Mediterranean region, but widely cultivated and naturalised elsewhere.

2. *T. hybridus* L. Plate LI Lehjiet il-Bodbot
Geropogon glabrum L. Hairless Goatsbeard

Glabrous, more or less glaucous annual 20-80 cm. high, with a long tap-root. Leaves long, linear, swollen at base. Capitula on peduncles thickened at apex. Involucre 30-45 x 10-20 mm.; with 8-9, linear-lanceolate bracts. Ligules pink or purplish-red, shorter than involucre. Receptacle pitted, with scales. Achenes 25-40 mm. long, cylindrical, gradually narrowed into a beak about equaling body; pappus of outer achenes of 5, long, unequal rigid hairs, of inner achenes of many intertwined plumose hairs. Fl. 4-5.

Cultivated and waste places. *Malta*: rare (G. Lanfranco), as at Fiddien, Ghajn Rihana (S. & C.G.; Borg); Mellieha (Reade; Borg); Gnejna, Mistra (G.D.; Borg); Ghajn Mula, Pwales (Borg); St. Paul's Bay (Delia); Wardija (Gauci).

Mediterranean region; Atlantic Islands.

55. *Scorzonera* L.

Like *Tragopogon* but leaves sometimes pinnatisect; involucre bracts in several rows; achenes usually cylindrical, not or obscurely beaked; pappus of several rows of hairs, usually all plumose at least at the base, or the outermost (rarely all) simple and scabrid.

1. *S. laciniata* L. Plate XLIX Divided-leaved Viper's-grass
Podospermum laciniatum (L.) DC.

Glabrous to more or less floccose-tomentose annual, biennial or sometimes monocarpic perennial, 5-60 cm. high, with short stock and taproot. Stems several, usually branched up to about the middle, erect or ascending. Basal leaves 30-200 x 2-15 mm., pinnatisect with linear to obovate, sometimes pinnatisect, acute segments; cauline similar. Involucre 7-20 mm., up to 40 mm. in fruit. Ligules equalling or up to 1½ times as long as involucre bracts, yellow. Achenes up to 17 mm. long, cylindrical, with strong ribs, brownish or greyish; pappus as long as achenes. $2n = 14$. Fl. 3-4.

On clay. *Malta*: infrequent (G. Lanfranco); Gnejna, San Martin (S. & C.G.; Borg); Selmun (Duthie; Borg); Wardija (Wright; Gulia; Borg; Gauci); Bingemma (Reade; Borg); Ghajn Tuffieha, Wied Butula, Ghajn Rihana, Wied Qamotta (Borg). Gozo: more frequent (Lanfranco); Ramla, Marsalforn (S. & C.G.; Borg); Chambray (Borg); near Rabat (Duthie; Borg); Ghar Ilma, below Qala (Gauci).

C. & S. Europe; W. Asia; N.W. Africa.

56. *Reichardia* Roth

Annual to perennial herbs. Stems 1-numerous, branched. Leaves entire to deeply pinnatisect, the cauline usually amplexicaul. Capitula few to numerous. Involucre bracts in several imbricate rows, at least the outer with scarious margins and often grading into the bracts of the peduncle. Receptacle without scales. Ligules yellow, the outer often with a reddish stripe on outer face, sometimes purplish at base. At least outer achenes 4- to 5-angled and transversely rugose; inner achenes always paler, often smooth, probably often sterile; pappus of numerous rows of soft simple hairs.

Outermost involucre bracts 3-5 x 1.5-2 mm., with a scarious margin up to 0.5 mm. wide

1. *picroides*

Outermost involucre bracts 4-7 x 2.5-3.5 mm., with a scarious margin up to 1.25 mm. wide

2. *intermedia*

1. *R. picroides* (L.) Roth
Picridium vulgare Desf.

Plate L

Kanclita
Common Reichardia

Glabrous perennial herb. Stems 1-numerous, 10-15 cm. high, glabrous or nearly so. Leaves glabrous or more or less papillose; basal 20-130 x 5-25 mm., oblanceolate, obtuse to acute, entire to pinnatisect, the lobes patent, long-attenuate at base into a winged petiole; lower cauline similar to basal but sessile, amplexicaul, the upper smaller and often more or less entire. Capitula 1-5; peduncles long, with numerous small, ovate, acuminate bracts which have a narrow scarious margin. Involucre 10-15 x 8-19 mm., glabrous; outermost bracts 3-5 x 1.5-2 mm., ovate, with a scarious margin up to 0.5 mm. wide, the inner lanceolate, obtuse, usually with a narrow scarious margin. Ligules yellow, the outer usually with a dark stripe on outer face, c. 1½ times as long as involucre. Achenes 2-3 mm. long, the outer 4- to 5-angled, transversely rugose, the inner smooth and apparently sterile. $2n = 14$. Fl. 1-12.

Cultivated and waste places. *Malta*, *Gozo* and *Comino*: very common (S. & C.G.; Borg; G. Lanfranco; Wolsley). *Cominotto* and *Selmunett*: (Borg).

Mediterranean region; Atlantic Islands.

2. *R. intermedia* (Schultz Bip.) Hayek
Picridium intermedium Schultz Bip.

Mediterranean Reichardia

Like *R. picroides* but often annual; outer involucre bracts 4-7 x 2.5-3.5 mm., broadly ovate, with a scarious margin up to 1.25 mm. wide. $2n = 14$. Fl. 1-12.

Cultivated places. *Malta*: Attard and Buskett (Borg).

Mediterranean region.

57. *Launaea* Cass.

Biennial or perennial herbs or spiny dwarf shrubs. Stems solitary or few, dichotomously much-branched. Leaves mostly basal. Capitula few to numerous. Involucre bracts in several rows, imbricate, with scarious margins. Receptacle without scales. All florets hermaphrodite. Ligules yellow, often with an olive stripe. Achenes cylindrical or slightly compressed, ribbed, not beaked; pappus of several rows of simple hairs.

1. *L. resedifolia* (L.) O. Kuntze

Divided-leaved Sow-thistle

Biennial or perennial herb 10-40 cm. high, often woody at the base. Leaves usually confined to lower half of plant, pinnatisect; lobes usually linear, entire, mucronate. Capitula terminal. Involucre 14-20 x 5-8 mm.; bracts 1.5-3 mm. wide, with broad scarious margin. Achenes 5-7 x 0.5-0.7 mm., cylindrical or somewhat narrowed at base, with 5-6 obscure ribs, papillose-puberulent to subglabrous; pappus 9-12 mm. long, persistent. Fl. 4-5.

Gozo: rare according to Gulia (Borg).

S.E. Spain; Sicily; N. Africa.

58. *Aetheorhiza* Cass.

Perennial herbs. Leaves usually all basal. Involucral bracts in several rows, imbricate. Receptacle pitted, without scales. Ligules yellow, sometimes with a reddish-purple or greenish stripe on the outer face. Achenes pale brown, with 4 deep grooves; pappus white, of many rows of hairs.

1. *A. bulbosa* (L.) Cass. Plate LI Bulbous Hawksbeard
Crepis bulbosa (L.) Tausch

Glaucous perennial 7-55 cm. high, with leafy stolons and long fibrous rhizomes sometimes bearing whitish, subglobose tubers. Stems 1-3, each with 1(8) capitula. Leaves usually glabrous; basal 10-250 x 4-35 mm., elliptical to obovate, mostly acute, gradually attenuate to the petiole, entire to subpinnatifid; cauline usually absent, but sometimes 1-2 near the base. Involucre 9-16 x 3-12 mm.; bracts lanceolate, usually obtuse, with blackish, clavate glandular hairs at the base and extending on to the stem. Achenes 3-5 x c. 0.5 mm., fusiform, more or less attenuate at apex, with hollow, swollen base. $2n = 16$, Fl. 3-4.

Dry places, especially in coastal areas. *Malta*: frequent (G. Lanfranco; Wolseley); as at Mdina (S. & C.G.); St. Paul's Bay, Gnejna, Mthaleb (S. & C.G.; Borg); Mdina, Bugibba, Salini, Baħrija, Marsaskala, Birzebbuga (Borg). *Gozo*: Rarala, Wied Bingenma, Xlendi, Ta' Harrax (S. & C.G.; Borg); San Dimitri (Duthie; Borg); Marsalforn, Qbajjar, Wied Ġorrot, Wied iż-Żejt, Chambray (Borg). *Comino*: Sta. Marija (Borg). *Cominotto*: (Duthie).

Mediterranean region.

59. *Sonchus* L.

Annual, biennial or perennial herbs, rarely woody at base; stems usually solitary, usually branched. Leaves denticulate to pinnatifid, often spiny; cauline amplexicaul. Capitula few to numerous. Involucral bracts in 3 rows, imbricate. Receptacle without scales. Ligules yellow. Achenes compressed, narrowed at both ends, with 1-4 ribs on each face, not beaked; pappus of two kinds of hairs; deciduous, rough solitary hairs and more or less persistent softer hairs in fascicles.

1. Achenes winged, smooth at least between the ribs; corolla-tube longer than ligule
 Achenes not winged, rugose; corolla-tube not longer than ligules

1. *asper*

2.

2. Plant rhizomatous; achenes elliptical
 Plant with a tap-root; achenes oblanceolate

4. *arvensis*

3.

3. Achenes abruptly narrowed at base; leaf-lobes obviously constricted at base
 Achenes gradually narrowed at base; leaf-lobes not or only slightly constricted at base

2. *tenerimus*

3. *oleraceus*

1. *S. asper* (L.) Hill

Tflef xewwiki
 Prickly Sow-thistle

Annual or biennial; glabrous, except for base of capitula and upper parts of stems and peduncles which are often glandular-hairy; stem 10-120(-200) cm. high, sometimes branched. Leaves glabrous, the lower spatulate, entire or pinnatifid; the upper auriculate, entire to pinnatisect, with triangular-ovate to linear,

dentate to denticulate lobes. Involucral bracts 35-45, 2-13 x 0.8-2 mm. Ligules shorter than corolla tube. Achenes 2-3 x 1 mm., strongly compressed and more or less winged, elliptical to broadly oblanceolate, smooth between the ribs, the margins and ribs often with recurved spinules. Pappus 6-9 mm. long, more or less deciduous. $2n = 18$. Fl. 1-12.

Two subspecies occur. Subsp. *asper* is annual, has thin, mostly cauline leaves without spiny margins, achenes with a few spinules on the margins and ribs and pollen-grains 35-42 μ . Subsp. *glaucescens* (Jordan) Ball (*S. glaucescens* Jordan) is biennial and perhaps sometimes perennial, the leaves are coriaceous, often forming a rosette at the base with spiny margins, achenes with dense, recurved spinules on margins and ribs, and pollen grains 30-35.5 μ .

Cultivated and dry places. *Malta*, *Gozo* and *Comino*: common (Borg; Gaudet).

Throughout Europe; N. and W. Asia; N. Africa; widely introduced elsewhere.

(*S. maritimus* L., Sea Sow-thistle, a rhizomatous perennial like *S. arvensis* but with smooth or slightly wrinkled achenes, may occur).

2. *S. tenerimus* L.

Tflef

Mediterranean Sow-thistle

Annual, biennial or perennial; stem 10-90 cm. high, branched (except in some annual variants). Leaves auriculate; the lower small, glabrous, with few lobes; the upper larger, often white-tomentose when young, pinnatisect, with many ovate to linear-lanceolate lobes strongly constricted at the base and entire or denticulate, or rarely with linear lobes. Base of capitula and upper parts of peduncles white-tomentose, often glandular-hairy. Involucral bracts c. 30, 1.5-12 x 1-2 mm. Ligules longer than corolla-tube. Achenes 2.5-3.3 x 0.5-1.2 mm., narrowly oblanceolate, tuberculate or rugose between the ribs; pappus 6-8 mm. long, more or less persistent. $2n = 14$. Fl. 1-5.

Walls, rocks, cliffs, fields and waste places. *Malta*, *Gozo* and *Comino*: common (Borg; G. Lanfranco; Wolseley).

Mediterranean region; Ethiopia.

3. *S. oleraceus* L.

Plate L

Tflef

Smooth Sow-thistle

Annual or biennial; stem 10-140 cm. high, simple or branched, often glandular-hairy in upper part and sometimes white-tomentose at base of capitula and upper parts of peduncles. Leaves glabrous; lower small, undivided, with narrowly winged petiole, the upper larger, pinnatifid to pinnatisect, lyrate or sometimes runcinate with the lobes not or only slightly constricted at base, auriculate. Involucral bracts 27-35, 2.5-12 x 1-3 mm. Ligules about as long as corolla tube. Achenes 2.5-3.3 x 0.75-1 mm., oblanceolate, rugose between the ribs; pappus 5-8 mm. long, more or less persistent. $2n = 32$. Fl. (1-) 2-4 (-12).

Waste and cultivated places. *Malta*, *Gozo*, *Comino* and *Cominotto*: common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Throughout Europe; N. and W. Asia; N. Africa; Atlantic Islands; widely introduced elsewhere.

4. *S. arvensis* L.

Perennial Sow-thistle

Perennial; stem 30-150 cm. high, simple or branched. Leaves glabrous, with dentate margins, the lower entire to pinnatifid with triangular lobes, the upper larger pinnatifid to pinnatisect with rounded, often dentate auricles. Capitula terminal, pedunculate. Involucral bracts 38-50, 6-15 x 1-2 mm. Ligules about as long as corolla-tube. Achenes 2.5-3.5 x 1-1.5 mm., elliptical, rugose; pappus 10-14 mm. long, persistent. $2n = 54$. Fl. 3-5.

Malta: San Anton Gardens and neighbouring cultivated areas where it was introduced (Borg; G. Lanfranco).

Europe to 70° N.; W. Asia; introduced in many parts to the world.

60. *Lactuca* L.

Herbs, usually with a single, branched stem. Cauline leaves often amplexicaul. Involucre cylindrical; bracts in several rows. Receptacular scales absent. Ligules yellow or bluish, 5-toothed. Achenes compressed, beaked, usually few-ribbed; pappus of 2 equal rows of simple hairs.

1. Margins of leaves and leaf-lobes prickly-toothed
Margins of leaves or leaf-lobes entire or nearly so, not prickly-toothed

2. Cauline leaves usually held vertically; ripe achenes olive-grey, with short rigid hairs at apex
Cauline leaves not held vertically; ripe achenes blackish, more or less glabrous at apex

3. Cauline leaves simple, ovate or orbicular; inflorescence a dense, corymbose panicle
At least upper cauline leaves linear-lanceolate with sagittate base; inflorescence a narrow spike-like panicle

1. *serriola*

4. *virosa*

2. *sativa*

3. *saligna*

1. *L. serriola* L.
L. serriola L. var. *silvestris* Lam.

Prickly Lettuce

Annual or biennial. Stem up to 180 cm. high, rigidly erect, glabrous or with rigid hairs, branched. Basal leaves narrowly obovate-oblong, usually deeply pinnatifid (rarely undivided); cauline less deeply lobed, held vertically; all rigid, spinulose on the midrib beneath. Inflorescence a long pyramidal or spike-like panicle. Involucre patent or deflexed when achenes ripe. Capitula with 7-15(-35) florets. Ligules pale yellow. Achenes greyish, elliptical, 5- to 9-ribbed, with short rigid hairs at apex; beak as long as body. $2n = 18$. Fl. 4-10.

Malta: Għirgenti (Borg).

S. and C. Europe; W. and C. Asia; N. Africa; Atlantic Islands; widely introduced elsewhere.

2. *L. sativa* L.

Hass
Garden Lettuce

Glabrous annual or biennial, with a slender tap-root, dense basal rosette and erect flowering stems 30-70(-100) cm high. Basal leaves undivided or runcinate-pinnatifid, shortly petiolate; cauline simple, ovate to orbicular, cordate-ample-

xicaul, sessile, not held vertically. Inflorescence a dense, corymbose panicle. Involucre erect when achenes are ripe. Capitula numerous, with 7-15(-35) florets. Ligules pale yellow, often violet-streaked. Achenes obovate, 5- to 9-ribbed; beak equalling body. $2n = 18$. Fl. 7-10.

(Occurring in many forms in cultivation, two of the commonest being var. *capitata* L., 'Cabbage Lettuce', which is cabbage-like in appearance, and var. *crispa* L., 'Cos Lettuce', which has long, erect, crisped and more or less lobed leaves).

Malta and Gozo: widely cultivated (Borg; Wolseley).

Origin unknown, but probably from S.W. Asia or Siberia. Long cultivated.

3. *L. saligna* L.

Least Lettuce

Annual or biennial. Stem 30-100 cm. high, glabrous, erect, whitish, branched. Lower leaves undivided to pinnatifid with narrow distant lobes; upper leaves oblong to linear with sagittate base; all often mucronate on the midrib. Inflorescence a spike-like panicle of numerous capitula. Capitula with 6-15 florets. Ligules pale yellow. Achenes elliptical, 7- to 8-ribbed, pale brown, subglabrous; beak 1.5-3 times as long as body. $2n = 18$. Fl. 7-10.

Cultivated and grassy places. Malta: Għnejna (S. & C.G.); Għnien il-Kbir, Buskett (S. & C.G.; Borg); Cottonera, Kordin (Gulia; Borg); Valletta Glacis, Attard, Għnien Ingraw (Borg). Gozo: Rundle garden (Gauci).

Mediterranean region; C. and W. Europe; W. Asia.

4. *L. virosa* L.

Plate L

Hassa salvagga
Great Lettuce

Annual or biennial, with foetid roots. Stem up to 200 cm. high, erect, glabrous or with rigid hairs below. Leaves obovate-oblong, dentate to pinnatifid with wide lobes, spinulose on the veins beneath. Bracts with appressed auricles. Inflorescence a long, pyramidal panicle. Capitula with c. 15 florets. Ligules pale yellow. Achenes 4-5 mm. long, blackish, 5-ribbed, winged, rugose; beak as long as body. $2n = 18$. Fl. 5-8.

Roadsides and urban waste places. Malta: frequent (Borg; Lanfranco), Hamrun, Zabbar, Għirgenti, Marsa (S. & C.G.); Sliema, Naxxar, Mosta and elsewhere (Wolseley). Gozo: Chambray, Rabat (Borg).

C. S. and W. Europe; N. Africa; W. Asia.

61. *Taraxacum* Weber

Perennial with tap-root. Stems few to many, simple. Leaves all basal, entire to lacinate-dentate or lobed. Capitulum solitary, usually flat-topped. Involucral bracts in 2 rows, glabrous or ciliate; inner erect, more or less linear; outer shorter, usually wider, often with paler margins, sometimes with a small lump (callosity) or small appendage (corniculate) just below the apex. Receptacle more or less flat, without scales. Ligules usually yellow, often with a darker stripe on outer face. Achenes fusiform to oblanceolate, often spinulose near apex, usually with a slender beak and a more or less clearly demarcated swollen region (cone) between beak and body. Pappus of many rows of simple, rough, usually white hairs.

(We have not seen any specimens of *Taraxacum* from Malta. Those pointed out to us by Maltese botanists and that illustrated by Lanfranco are in fact *Hypoxis radicata*. We have included the descriptions of the following species as geographically it is reasonable for *T. bithynicum* to be in Malta, and *T. officinale* could be cultivated).

Outer involucrel bracts with wide, pale or scarious margins, at least $\frac{1}{4}$ of area of bract

Outer involucrel bracts with at most a narrow, pale or scarious margin

1. *T. bithynicum* DC. sensu lato

1. *bithynicum*

2. *officinale*

Cikwejra salvagga
Southern Dandelion

Leaves 5-15 cm. long, oblanceolate to obovate, entire to lobed, horizontal, thick, glabrous or hairy beneath; lobes 6-7 on each side, patent, broad-based, often obtuse, dentate; petiole often purplish. Scapes 5-10 cm. high, numerous, thin, ascending or procumbent, glabrescent. Capitula 10-25 cm. in diameter. Involucre 9-12 x 7-10 mm.; outer bracts broadly ovate, acuminate, $\frac{1}{2}$ to entirely scarious, suffused red or purple, more or less appressed, often conspicuously reticulate-veined, cerniculate. Ligules short, wide, pale yellow with a red, purple or brown stripe. Achenes greyish-brown or straw coloured; body 3.5-4 mm. long, more or less tuberculate, often throughout; cone short, conical; beak 4-7 mm. long, rather thick. Mainly autumn-flowering. Sexual or apomictic. Fl. 9-2.

(It is not known if more than one segregate species occurs, but it is probable that all plants could be referred to *T. minimum* (Brigenti ex Guss.) Terracc.)

Grassy and waste places, and according to Borg often collected and sold for salads, Malta and Gozo; common (S. & C.G.; Borg; G. Lanfranco).

S. Europe.

2. *T. officinale* Weber sensu lato

Common Dandelion

Leaves 5-40 cm. long, entire to very lacinate, often large and coarse, never thin, never spotted; lobes usually more or less triangular; petiole often winged. Scapes 5-40 cm. high, stout, erect or ascending, usually hairy. Capitula 25-75 mm. in diameter, often convex. Involucre 12-25 mm. long; outer bracts up to 17 mm. long; linear-lanceolate, usually rather dark, more or less glaucous green, paler on inner surface, pale margin often present but never conspicuous, erect to deflexed, cerniculate or slightly callosed. Ligules long, narrow, medium yellow, usually with a brownish stripe. Achenes brownish; body 2.5-3.5 mm. long, tuberculate or spinulose; cone 0.2-0.7 mm. long, conical; beak 7-15 mm. long, slender. Apomictic; more rarely sexual. Fl. 3-5.

Sometimes cultivated. Malta: (Borg).

Throughout Europe; N. Africa; introduced elsewhere.

62. *Chondrilla* L.

Biennial to perennial herbs. Stems 1-5, much-branched. Leaves entire to runcinate-dentate; cauline often narrow or bract-like. Capitula numerous, with less than 15 florets. Involucre 9-12 x 2.5-5 mm., cylindrical; bracts in 2 rows, the outer much shorter than the inner. Receptacle flat, without scales. Ligules yellow. Achenes with numerous ribs; beak very short to longer than the remainder

of the achene, rarely absent, usually surrounded at its base by up to 6 short scales forming a collar; pappus of numerous rows of soft, simple hairs.

1. *C. juncica* L.

Plate LI

Common Chondrilla

Glaucous biennial to perennial. Stems usually solitary, 50-100 cm. high, with numerous, ascending branches, glabrous or with rigid hairs particularly below, sometimes with short, appressed hairs. Leaves glabrous or with a few rigid hairs; basal 40-120 x 15-45 mm., soon withering, oblanceolate, more or less acute, deeply and irregularly runcinate-dentate, narrowed to a short winged petiole; lower cauline sometimes like basal, the remainder usually long-linear, sometimes lanceolate, entire or denticulate. Capitula numerous, with 9-12 florets, terminal, lateral or axillary, solitary or in groups of 2-5, sessile or with rather short peduncles. Involucre 9-12 x 2.5-5 mm.; bracts linear-lanceolate, obtuse to subacute, glabrous or sparsely tomentose, sometimes with a row of rigid hairs on the median line, the inner 7-9. Achenes 8-9 mm. long, with a slender beak half as long as to longer than the rest of the achene. Fl. 4-6.

Dry places. Malta: Ghadira (S. & C.G.; Godfrey; Borg).

C. & S. Europe; extending to C. Russia; N. Africa.

63. *Crepis* L.

Annual to perennial herbs. Stems 1- many. Basal leaves usually rosulate. Involucre of an outer and inner series of bracts, outer up to 3 (rarely 5/6) as long as inner. Receptacle flat or convex, usually pitted, margins of the pits often ciliate; rarely with rigid hairs or narrow, membranous scales between the florets. Ligules usually yellow, sometimes orange, pink, white or parti-coloured. Anthers with long or short appendages. Style branches filiform. Achenes yellowish to black, uniform or of 2 or 3 kinds, 4- to 35-ribbed, usually narrowed towards apex, beaked or beakless. Pappus of 1 to many series of hairs, the hairs usually white and soft, sometimes dusky or yellow and brittle.

Leaves in a flat basal rosette; capitula in sessile clusters in centre of rosette

1. *pusilla*

Leaves basal and on stem up to 100 cm. high; capitula on a branched inflorescence

2. *capillaris*

1. *C. pusilla* (Sommier) Merxm.
Melitella pusilla Sommer

Plate L

Malta Hawksbeard

Annual. Leaves 20-70 x 2.5 mm., in a flat basal rosette. Linear-spathulate, entire to runcinate-pinnatifid, attenuate at base, subglabrous. Capitula in sessile clusters of 2-8 in centre of basal rosette. Involucre c. 4 x 3-4 mm.; outer bracts 2-4, linear, membranous, inner linear-lanceolate, obtuse with a membranous apex. Achenes 1-1.5 mm. long, shortly beaked, of 2 kinds: inner and some outer whitish, oblong, compressed, striate, remaining outer brownish, thicker, angled, more finely striate and enclosed by the inner involucrel bracts. $2n = 10$. Fl. 3-5.

Dry places. Malta: very rare (G. Lanfranco), between Dingli and Buskett (S. & C.G.); near Ghar Bittija (S. & C.G.; Borg). Gozo: between Wied Bingemma and Wied Rihan (S. & C.G.; Borg; Sommer); Marsalforn Valley (S. & C.G.; Borg). Not found recently (Wolseley).

S. Greece, Kriti; S. Portugal; S. Australia.

2. *C. capillaris* (L.) Wallr.
C. virens L. nom. illegit

Smooth Hawksbeard

Annual or biennial. Stems 1-numerous, (5-)20-100 cm. high. Basal leaves up to 30 x 4.5 cm., numerous, lanceolate or oblanceolate, obtuse or acute, denticulate, dentate, runcinate-pinnatifid, or lyrate, pinnatisect or 2-pinnatisect, narrowed at base. Inflorescence branched from base, or only above, usually with many capitula. Involucre 5-9 x 3-8 mm.; bracts linear to lanceolate, obtuse to acute, glabrous, tomentose or sparsely glandular-hairy. Achenes 1.5-2.5 mm. long, fusiform or oblong, pale to dark brown, 10-ribbed. $2n = 6$. Fl. 5-10.

Malta: frequent in Addolorata Cemetery and neighbourhood (Borg; Gauci); Lija-Mosta road, Luqa (Gauci).

Throughout Europe except the extreme north; N. America.

(No specimens have been seen of *C. capillaris* from the Malta localities and it is possible that the plant is really *C. neglecta* L. which can distinguished from it by its beaked achenes).

64. *Andryala* L.

Annual to perennial herbs. Stems usually solitary. Leaves entire to pinnatisect, each leaf few to numerous, often more or less amplexicaul. Capitula usually few to numerous, rarely solitary. Involucral bracts in 2 to several rows. Receptacle pitted, the margins of the pits lacinate-dentate and with cilia which are often longer than the subtending achenes; sometimes with scales enfolding some or all the florets. Ligules yellow, the outer sometimes with a reddish stripe on outer face. Achenes oblong or obconical, truncate at apex, with 8-10 prominent ribs; pappus of greyish hairs, falling entire.

1. *A. integrifolia* L.

Plate XLIX

Common *Andryala*

Annual to perennial. Stems 12-30 cm. high, sparingly to much-branched, with sparse to dense stellate and short simple eglandular hairs, and sometimes with glandular hairs above. Leaves 20-30 x 3-30 mm., with dense stellate and short eglandular hairs, linear, oblanceolate, lanceolate or ovate, obtuse to acute, entire to deeply pinnatisect, the lower usually narrowed at base, the upper usually broader and sometimes semiamplexicaul; basal leaves usually few, the cauline numerous, sometimes aggregated towards the base. Capitula few to numerous. Involucre 7-11 x 5-10 mm.; bracts linear-lanceolate, obtuse to acute, with dense stellate and short simple eglandular hairs and longer glandular hairs. Achenes c. 1.5 mm. long. $2n = 18$. Fl. 5-8.

Malta: gardens at Casa Leoni and neighbourhood and Ghajn Dwieli (Borg).

Mediterranean region and S.W. Europe.

65. *Pilosella* Hill

Perennial herbs with horizontal or oblique rhizome, with a persistent rosette of leaves from the axils of which are usually developed prostrate leafy, or underground scaly stolons, sometimes bearing capitula at their apices. Stems 1-numerous. Leaves entire or nearly so. Involucral bracts in several irregularly imbricate rows. Receptacle without scales, flat, pitted. Ligules yellow (often with a reddish stripe on outer face) or reddish. Achenes 10- to 13-ribbed, each rib shortly projecting to form a crenulate apex; narrowly obconical, never beaked; pappus brittle, whitish, in 1 row with a few shorter than the rest.

1. *P. hoppeana* (Schultes) C.H. & F.W. Schultz Eastern Mouse-ear Hawkweed
Hieracium hoppeanum Schultes

Stolons few, very short, thick, with large leaves close together. Rosette leaves rather numerous, oblanceolate to oblong, with long, white, simple, eglandular hairs on both surfaces and the margins, and dense stellate hairs on the lower surface and rarely the upper. Scapes up to 40 cm. high, each with a single capitulum, with rather numerous simple eglandular and dense glandular hairs. Involucral bracts (6-) 11-14 x 1-4 mm., outer ovate, inner sometimes lanceolate, abruptly narrowed to a subacute or rounded-obtuse apex, with simple eglandular and glandular hairs in varying proportions or one of them absent, stellate hairs dense. Ligules yellow, outer usually with a dark red stripe on outer face. $2n = 45$. Fl. 6-8.

Gozo: recorded by Gulia (Borg).

C. Europe; E. Mediterranean region; W. Asia.

MONOCOTYLEDONS

HELOBIAE

XCIV. ALISMATACEAE

Annual or perennial herbs, erect or sometimes with floating leaves, living in water or wet places. Leaves petioled. Flowers actinomorphic, usually hermaphrodite, often whorled. Perianth in 2 whorls; outer persistent. Stamens (3-)6 or more, free; anthers 2-lobed. Ovary superior, carpels usually free; ovules 1-several. Fruit usually a head or whorl of achenes; seeds small.

Leaves cuneate, rounded or subcordate at base; ripe carpels c. 1 mm. long, not beaked

1. *Alisma*

Leaves cordate at base; ripe carpels c. 13 mm. long, with a long beak

2. *Damaschinum*

1. *Alisma* L.

Glabrous scapigerous perennials with acrid juice. Inflorescence much-branched, branches whorled. Carpels numerous, in one whorl; style lateral. Ripe carpels strongly compressed.

Leaves ovate, rounded to subcordate at base; style arising below the middle of the fruit; anthers about twice as long as broad

1. *plantago-aquatica*

Leaves lanceolate, gradually narrowed at base; style arising above the middle of the fruit; anthers about as long as broad

2. *lanceolatum*

1. *A. plantago-aquatica* L.
var. *latifolia* Gilib.

Bisbula ta' l-ilma
Water-plantain

Perennial 20-200 cm. high. Stem stout. Leaves long-petioled, 8-20 cm. long, ovate, rounded or subcordate at base; first leaves reduced; floating leaves sometimes occur in the water form. Inflorescence branches more or less straight,

usually ascending. Flowers up to c. 1 cm. long, usually pale lilac. Outer perianth-segments oblong, inner rounded. Stamens longer than carpels; anthers about twice as long as broad. Fruit ovate; style more or less straight, long, arising below the middle of the fruit. Carpels c. 20, in a more or less flat head. $2n = 12, 14, 16, 24, 28, 31, 5-8$.

Malta: Wied Bufula near St. Paul's Bay and perhaps elsewhere (Borg).

North temperate regions; Australia.

2. *A. lanceolatum* With. Plate LII Bisbula ta' l-Ima
A. *plantago-aquatica* sensu Borg Narrow-leaved Water-planian

Perennial, 20-200 cm. high. Leaves long-petioled, lanceolate, tapering gradually into petiole. Floating leaves sometimes occur. Flowers up to 1 cm. long, usually pink. Outer perianth segments ovate, inner acute. Stamens (at flowering) somewhat longer than the carpels. Anthers about as long as broad. Fruit ovate. Style more or less straight, short, arising near the top of the fruit. Carpels c. 20, $2n = 28, 23, 31, 5-8$.

Along watercourses and in standing water. Malta: locally frequent (G. Lanfranco), as at Ghajn Tuffieha, Gnien il-Kbir, Wied Gerzuma, Gnien Ingraw (Borg); Mtahlob, Gnejna, Buskett, Ghajn il-Kbira, Girgenti (Borg; Wolseley); Chadwick Lakes (Haslam; Wolseley).

Europe; N. Africa; W. Asia.

2. *Damasonium* Miller

Glabrous, scapigerous annuals. Inflorescence of several, usually simple whorls. Inner perianth-segments entire. Stamens 6. Carpels 6-10, in one whorl, connate at base; style apical. Ovules 2-several in each carpel. Ripe carpels (1-) 2-several-seeded, indehiscent or tardily dehiscent at base, spreading stellately.

1. *D. alisma* Miller Plate LII Starfruit

Erect annual 5-30(-60) cm. high. Leaves long-petioled, floating or sometimes submerged, 3-5 cm. long, ovate to oblong, cordate at base. Flowers c. 6 mm. in diameter, white. Inner perianth-segments caducous. Ripe carpels c. 13 mm. long, tapering into a long beak, usually 2-seeded. Fl. 3-5.

In freshwater rock pools on the limestone plateaus. Malta: rare (G. Lanfranco), as at San Pawl tat-Targa (S. & C.G.; Borg; Wolseley); Wied Inčita (S. & C.G.; Borg); Wied il-Ghasel (Duthie; Borg; Wolseley); Hark il-Hamlem (Gulia; Borg); Bugibba (Borg); Nigret (Wolseley). Gozo: Xlendi (S. & C.G.; Borg); Sannat, Mgarr ix-Xini (Duthie; Borg); Ta' Cené (Borg; Wolseley); Munxar (Wolseley).

W. & S. Europe; S. Russia; N. Africa.

XCV. HYDROCHARITACEAE

Annual or perennial aquatic plants. Leaves submerged, sometimes floating, linear or orbicular, either sessile or petiolate; main veins more or less parallel connected by perpendicular or ascending subsidiary veins. Stipules sometimes present. Spathe of 2 bracts, enclosing inflorescence. Flowers actinomorphic, usually unisexual; solitary or in cymose inflorescences. Perianth trimetrous. Stamens (2-)3, several in 1 or more whorls. Ovary inferior, of (2-)3-15 connate carpels, unilocular, placenta parietal, ovules numerous. Styles (2-) 3-15, usually

split into 2 stigmatic branches. Fruits indehiscent, rarely stellately dehiscent. pericarp fleshy or membranous; seeds with straight embryo, endosperm absent.

1. *Halophila* Thou.

Monococious or dioecious. Rhizomes creeping, rooting at the nodes; 2 scales at each node, one embracing the rhizome. Leaves in pairs, in pseudo-whorls or distichously arranged, sessile or petiolate, linear, lanceolate, oblong-elliptic or ovate, entire or serrulate. Spathe sessile, composed of 2, overlapping, membranous, elliptic, obovate to suborbicular, acute, rounded to emarginate or indented bracts, keeled, with entire or rarely ciliate or serrulate margins. Flowers usually unisexual; male pedicellate, perianth segments 3, imbricate, stamens 3, alternating with the perianth segments; female sessile; ovary ellipsoid or ovoid, unilocular, hypanthium crowned by 3 reduced segments; styles linear, 3-5. Fruit ovoid or globose, rostrate, unilocular with membranous pericarp. Seeds few to numerous, globose or subglobose.

1. *Halophila stipulacea* (Forsk.) Ascherson Plate LI *Halophila*

Dioecious. Rhizome 0.5-2 mm. thick with one root at each node. Internodes 1-4 cm. long; scales 12-17 x 6-10 mm., elliptic or obovate, olded and incised along keel, white to transparent, sometimes tinged with purple, the two apical lobes obtuse. Leaves in pairs, 30-60 x 2.5-8 mm.; base cuneate or gradually decurrent into petiole, margin serrulate especially in the apical region, subsidiary veins ascending at angles between 45° and 60°, joining the intramarginal veins. Petiole 5-15 mm. long, sheathing asymmetrically at base. Spathe ovate, acute, keeled, hairy; margin at one side glabrous and at the other ciliate. Male flower not seen. Ovary 3-4 mm. long; styles 3, 20-25 mm. long. Fruit 5 mm. long, ellipsoid; beak 4-6 mm. long; pericarp membranous. Seeds 30-40, globose, both ends contracted.

In shallow water on sandy or muddy substrate. Malta: rare, Marsaxlokk (Lanfranco); Salini (Wolseley).

Native in Western Indian Ocean, East African coast to Mauritius and Red Sea; introduced to Mediterranean region probably via the Suez Canal.

XCVI. JUNCAGINACEAE

Scapigerous marsh or aquatic herbs. Leaves mostly radical, linear, sheathing at the base. Flowers small, in spikes or racemes, actinomorphic or slightly oblique, hermaphrodite or unisexual, 2-3-merous. Bracts 0. Perianth segments in 2 series, green or reddish. Stamens 6 or 4, filaments very short. Ovary superior; carpels 6 (sometimes 3 sterile) or 4, free or more or less connate; style short or 0; ovules solitary, basal.

1. *Triglochin* L.

Rhizomatous herbs with fibrous roots and more or less tuberous stems. Leaves erect, linear, half-cylindrical. Inflorescence a raceme. Flowers 3-merous. Perianth-segments deciduous. Carpels all fertile, or alternate ones sterile. Fruit dehiscing by the carpels separating from the central axis.

Pedicels spreading, subequal to the fruit; spring flowering 1. bulbosa
Pedicels erect, shorter than the fruit; autumn flowering 2. laxiflorum

1. *T. bulbosa* L. subsp. *barrelieri* (Loisel) Rouy

Haxixa tal-baħar
Bulbous Arrowgrass

Perennial 10-30 cm. high, stem delicate, bulbs aggregated, with interwoven fibres. Leaves rather fleshy, grooved on upper surface. Pedicels spreading, subequal to the fruit. Fl. 3-4.

Saltmarshes. Malta: locally frequent (G. Lanfranco), as at Wied il-Għomer, St. Andrews' Canal, Marja (S. & C.G.; Borg); Ghajn Rihana (Dorg); Salini (Borg; Haslam; Wolseley); Ghadira (Haslam; Wolseley).

S. Europe; N. Africa.

2. *T. laxiflorum* Guss.

Plate LII

Lesser Arrowgrass

More delicate than *T. bulbosa* subsp. *barrelieri*. Leaves furrowed on both surfaces. Pedicels shorter than fruit, appressed to stem. Fl. 9-11.

Damp places on waste and cultivated ground. Malta: locally frequent (G. Lanfranco), as at Mellieħa, Munsija, Marsaxlokk (S. & C.G.; Borg; Wolseley); Marja, Wied il-Għasel (Borg); Wied Inġita (Godfrey; Borg; Wolseley). Gozo: Marsalforn (Borg; Wolseley); Xlendi, Ta' Ġenġ (Borg).

Italy, Algeria.

XCVII. POTAMOGETONACEAE

Aquatic herbs of fresh, brackish or salt water. Leaves alternate or opposite, dischous, usually sheathing at the base; stipulate. Flowers usually hermaphrodite, actinomorphic, hypogynous, in axillary or terminal, bractless spikes. Perianth segments 4; stamens 4, sessile on the claws of the perianth segments; carpels (1-3)-4, free, each with 1 campylotropous ovule near the base of the ventral margin; stigma more or less sessile. Fruit a small, green or brownish drupe or achene; seed non-endospermic.

1. Flowers in short, terminal, umbellate racemes; carpels becoming long stipitate in fruit

2. *Ruppia*

Flowers in spikes; carpels more or less sessile

2. Rhizome densely covered with stiff fibres; spikes subtended by a group of leaf-like bracts

3. *Posidonia*

3. Flowers hermaphrodite, arranged all round or on 2 sides of a terete rachis; plants of fresh water
- Flowers unisexual; arranged on one side of a flat rachis; plants of marine water

1. *Potamogeton*

4. *Zostera*

1. *Potamogeton* L.

Chiefly perennial, rhizomatous herbs of fresh water, overwintering both by the rhizome and by specialised winter buds (turions). Submerged leaves thin, translucent, linear or with broad, sessile or petiolate blade; floating leaves, if present, opaque, usually narrowly to broadly elliptical-oblong. In most species the leaf has a more or less delicate sheathing scale in its axil (stipule). Spikes ovoid to cylindrical, dense, lax or interrupted; submerged or emerged. Perianth of 4, free, rounded, shortly clawed, valvate segments (sometimes regarded as appendages of the connectives of the anthers).

1. Floating leaves present, elliptical to ovate-lanceolate

1. *natans*

Floating leaves absent

2.

2. Leaves 3-9 x 0.5-1.5 cm., lanceolate, serrate and often undulate

2. *crispus*

Leaves 5-20 cm. x 0.25-2 mm. linear, entire

3. *pectinatus*

1. *P. natans* L.

Broad-leaved Pondweed

Rhizome extensively creeping. Leafy stems up to 100-500 cm. long, more or less terete, not or little branched. Submerged leaves 15-20-80 cm. x 1.3 mm., linear, with several longitudinal veins, rarely with a small blade. Floating leaves petiolate, 2.5-12.5 x 0.8-7 cm., elliptical to ovate-lanceolate, more or less acute, rounded or cordate at base, involute at the base after emergence, coriaceous, stalk appearing jointed just below the blade (because of decurrent wings); longitudinal veins c. 20-25; transverse veins indistinctly visible against the light. Stipules 5-12(-18) cm. long, persistent. Fruit spike 3-8 cm. long; peduncle 2-12 cm. long, axillary, stout. Fruit 4-5 x 3 mm., olive green, obovoid, somewhat compressed; ventral margin convex, dorsal more or less semicircular and keeled when dry; beak short, straight. $2n = 52$. Fl. 2-3.

Ditches. Malta: San Pawl tat-Targa, Wied il-Għasel (Gulia; Borg).

Northern hemisphere.

2. *P. crispus* L.

Curled Pondweed

Rhizome creeping, perennating or arising from a turion. Stem 30-120 cm. long, slender, compressed, more or less 4-angled with broad sides furrowed when mature, repeatedly forked above. Submerged leaves 3-9(-10.5) cm. x (5-)8-15 mm., lanceolate to linear-lanceolate, rounded and obtuse, usually serrate and often strongly undulate, often reddish, translucent; longitudinal veins 3-5, laterals close to the margin, with no faint intermediate longitudinal veins. Floating leaves absent. Stipules 10-20 mm. long, soon becoming torn and decayed. Fruit spike c. 1-2 cm. long, rather lax; peduncle 2.5-7(-10) cm. long, fairly slender, narrowed upwards. Fruit 2-4 mm. long (excluding beak), dark olive, compressed; ventral margin convex, dorsal strongly rounded; beak about equalling rest of fruit, more or less sickle-shaped. $2n = 52$. Fl. 2-4.

Ditches. Malta: very rare at Mellieħa (Gulia; Borg).

Old World; introduced in N. America.

3. *P. pectinatus* L.

Fennel Pondweed

Rhizome creeping, usually arising from a tuberous winter bud. Leafy stem 0.4-2 m. long, very slender, more or less cylindrical, usually much-branched. Submerged leaves 5-20 cm. x 0.25-2(-5) mm., setaceous to linear, dark green, more or less translucent; longitudinal veins 3-5 (laterals sometimes indistinct). Floating leaves absent. Stipular sheath 2-5 cm. long, open and convolute with a whitish margin; stipules long, more or less blunt, deciduous. Spike 2-5 cm. long, of 4-8 usually 2-flowered whorls, more or less interrupted; stalk 3-10 (-25) cm. long, not thickened upwards. Fruit 3-5 x 2-4 mm., olive, tinged with orange, more or less obovoid, more or less compressed; ventral margin straight or somewhat convex, dorsal semicircular, 1-3-keeled; beak continuing ventral margin, short. $2n = 78$. Fl. 2-3.

Ditches. *Malta*: San Pawl tat-Larga (Gulia; Borg).

Almost cosmopolitan.

2. *Ruppia* L.

Submerged aquatic herbs of salt or brackish pools, rarely in fresh water. Leaves linear or setaceous, sheathing at the base. Inflorescence a short terminal raceme appearing subumbellate. Bracts 0. Flowers hermaphrodite, small. Perianth 0. Stamens 2, opposite each other; filaments very short and broad. Ovary superior; carpels 4 or more, becoming long-stipitate in fruit; ovate, solitary, pendulous, campylotropous. Fruit indehiscent.

Peduncle in fruit many times longer than pedicel
Peduncle in fruit about equalling pedicel

1. *spiralis*
2. *maritima*

1. *R. spiralis* L. ex Dumort.
R. maritima sensu Borg

Spiral Tassel-weed

Slender perennial 30 cm. or more long. Stems filiform, much-branched. Leaves alternate or opposite, filiform (c. 1 mm. wide), dark green, sheaths dilated, brownish. Peduncle 10 cm. or more long, much elongated after flowering, several times as long as pedicels of the carpels, often spirally coiled. Fruit ovoid, nearly symmetrical, beak slightly oblique. Fl. 3-7.

Malta: Marsaxlokk, Marsa, Marsaskala, St. Paul's Bay (Borg).

Temperate and subtropical regions.

2. *R. maritima* L.
R. maritima var. *rostella* (Koch) Fiori

Beaked Tassel-weed

Slender perennial 30 cm. or more long. Stems filiform, much-branched. Leaves filiform, c. 0.5 mm. wide, light green, sheaths narrow. Peduncle 0.5-5 cm. long, shorter than to twice as long as the pedicels of the carpels, flexuous but not spirally twisted. Fruit very asymmetrical, ventral side convex ending in a long beak, dorsal side strongly gibbous at base. Fl. 3-7.

Saltmarshes. *Malta*: locally frequent (G. Lanfranco), as at Marsaxlokk (S. & C.G.; Borg); Marsa, Marsaskala, St. Paul's Bay (Gulia; Borg); Salini (Borg; Wolseley).

Europe (excluding Iceland); N. Africa; W. Asia; N. America.

3. *Posidonia* Koenig

Submerged marine perennials; leaf blades linear, flat. Flowers hermaphrodite, in a spike composed of 3-7-flowered spikelets; terminal flower male; spike and spikelets with an involucre of leafy bracts. Perianth 0. Stamens 3, supported by a thick scale-like connective; anthers sessile, reddish, dehiscing outwards. Ovary 1; stigma stellate-papillose, sessile. Fruit drupe-like, olive-shaped.

1. *P. oceanica* (L.) Delile

Plate LI

Alga
Posidonia

Rhizome stout, branched, lower part covered by fibrous leaf bases; often detached by movement of waves and stones. Leaves 10-50 cm. x 6-10 mm, ribbon-like, entire, in clusters of 5-10 at the ends of the branches, c. 13-nerved,

rounded at apex. Flowering stem dichotomous at apex, held by a scape 10-20 cm. high, shorter than the leaves. Fl. 5-6.

In shallow water, especially on sandy bottoms. Often thrown up in abundance onto the coast. *Malta*, *Gozo* and *Comino*: common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region.

4. *Zostera* L.

Submerged marine perennials; rhizome monopodial, creeping and rooting at nodes, bearing alternate, distichous grass-like leaves. Flower shoots annual, erect, internodes long. Flowers monoecious, male and female alternating in two rows, male sometimes with reduced perianth of bract-like structure. Pollination by water; reproduction mainly vegetative.

Leaves usually 5-10 mm. wide; sheaths entire; seeds ribbed
Leaves up to 1 mm. wide; sheaths split; seeds smooth

1. *marina*
2. *noltii*

1. *Z. marina* L.

Plate LI

Eelgrass

Rhizome 2-5 mm. thick, internodes short. Leaves of sterile shoots 20-50(-100) cm. x (2-)5-10 mm., rounded and mucronate at apex, sheaths closed. Leaves of fertile shoots shorter and narrower. Flower stems up to 60 cm. long, much-branched. Inflorescence (4-) 9-12(-14) cm. long, membranous margins of sheath 0.5-1.0 mm. wide, stigma twice as long as style. Seed 3.5 mm. long, ellipsoid, pale brown or bluish-grey, ribbed. $2n = 12$. Fl. 4-8.

Shallow muddy coastal water. *Malta*: frequent, at St. Paul's Bay, Qalet Marku (Borg); Salini (Borg; Wolseley); Mistra (Wolseley). *Gozo*: Mgarr, Marsalforn (Borg).

Europe from 71° N. in Norway to the Mediterranean; W. Greenland to (64° N.); Atlantic and Pacific coasts of N. America.

2. *Z. noltii* Hornem.

Dwarf Eelgrass

Z. nana Roth pro parte; *Z. minor* Nott.

Slender, shortly creeping, rhizomatous. Rhizome 0.5-1 mm. thick. Leaves of sterile shoots (4-)6-12(-20) cm. long, up to c. 1 mm. wide; sheaths open. Flower stems unbranched or nearly so; peduncles 0.5-2 cm. long. Inflorescence 3-6 cm. long, bract-like perianth present, sheath inflated. Seed 2 mm. long, subcylindrical, smooth, dark brown when ripe. $2n = 12$. Fl. 4-8.

Similar places to *Z. marina*. *Malta*: rare, St. Paul's Bay, Marsaskala, Birzebbuga (Gulia; Borg); Salini, Marsamxett (Borg).

Europe from S.W. Norway and Sweden to the Mediterranean.

XCVIII. ZANNICHELLIACEAE

Aquatic herbs of fresh, brackish, or salt water with slender creeping rhizomes. Leaves alternate, opposite or more or less whorled; sheathing at the base. Flowers very small, solitary, axillary or in cymes, unisexual, hypogynous. Pollination hydrophilous. Fruit of 1-9, sessile or stalked achenes, each with one seed.

Plant of fresh or brackish water; stems not rooting; fruits with a long beak
 Plant marine; stems rooting at the nodes; fruit oval, without a beak

1. Zannichellia L.

Perennial monoecious herbs of fresh or brackish water with slender leafy stems. Leaves mostly opposite, linear, entire, with stipules. Flowers axillary, in a hyaline, deciduous, cup-shaped spathe, 1 male and 2-5 female flowers often in the same spathe. Flowers of 1 stamen; or 1 carpel with flattened stigma. Perianth 0. Fruit a stalked more or less curved achene.

1. *Z. palustris* L.

Plate LII

Harira ta' l-ilma
 Horned Pondweed

Submerged, filiform, commonly to 50 cm. long. Leaves 1.5-5 (-10) cm. x 0.4-2 mm., parallel-veined, translucent. Style stout below; stigma perianth. Achenes 2-6 mm. long, excluding the persistent style (0.5-1.5 mm.); dorsal margin toothed. Very variable. $2n = 28$. Fl. 11-5.

In rock pools. *Malta*, *Gozo* and *Comino*: frequent (S. & C.G.; Borg; G. Lanfranco; Wolsley; Ganci).

Cosmopolitan.

2. Cymodocea Koenig

Plant with creeping rhizome, rooting at the nodes. Flowers dioecious, axillary, solitary; male with 2 large anthers, 4-loculate, borne on a long stalk like a filament, inserted on a massive base of equal length to filament; female with 2 subsessile ovaries, attenuated into the style; style divided into 2 long ribbon-like stigmas. Fruit an achene, stony, indehiscent, compressed, semi-oval.

1. *C. nodosa* (Ucria) Ascherson

Alka
 Cymodocea

Perennial. Rhizomes cylindrical, purple, ringed; leaf scars close. Leaves with cylindrical wings, open, distinctly auricled; lamina about 40 cm. long, 1.5-5 mm. wide, linear, 6-8-nerved, denticulate on margins above. Peduncle up to 10 cm. long. Anthers yellow, red-pointed, 1.5 cm. long. Fruit c. 8 mm. long. Fl. 8-9.

Muddy inlets of the coast. *Malta*: Marsa, Kalkara, Msida (Gulia; Borg); Santa Rokku (M'xett), St. Paul's Bay, Salini, Qalet Marku; Marsaxlokk (Borg). *Gozo*: Mgarr (Borg).

Mediterranean and Atlantic coasts.

LILIIFLORAE

XCIX. LILIACEAE

Herbs, rarely shrubby, sometimes climbing. Inflorescence usually racemose. Flowers usually hermaphrodite, actinomorphic, usually 3- (rarely 2-, 4-, or 5-) merous. Perianth usually petaloid in 2 similar whorls. Stamens in 2 whorls opposite perianth segments. Ovary superior, usually 3-celled with axile placentation. Ovules usually numerous, in 2 rows on each placenta, anatropous. Fruit a capsule or berry.

A family of diverse habit and appearance but uniform floral structure.

1. Inflorescence umbellate, at first enclosed in a spathe which splits into bracts
 Inflorescence racemose or simple

2.
 3.

2. Perianth segments free or nearly so; plant smelling of onion

12. *Allium*

Perianth segments united at base into a short tube; plant not smelling of onion

13. *Nothoscordum*

3. Plant shrub-like; much branched

4.

Plant herbaceous; or leaves in a basal rosette, unbranched

6.

4. Flowers borne on a leaf-like cladode

15. *Ruscus*

Flowers borne in the axils of leaves or reduced leaves

5.

5. Leaves reduced or absent; cladodes needle-like but not hooked

15. *Asparagus*

True leaves only present, broadly cordate; styles 3; plant scrambling with hooked spines

16. *Smilax*

6. Cauline leaves present

7.

Cauline leaves absent

8.

7. Inflorescence a raceme; anthers dorsifixed, versatile
 Inflorescence not a raceme; anthers basifixed

4. *Lilium*

5. *Tulipa*

8. Flowers stemless

3. *Colchicum*

Flowers in a racemose or corymbose inflorescence

9.

9. Leaves perennating, rigid, succulent, usually spiny; flowers red or orange

2. *Aloe*

Leaves annual, soft, never spiny; flowers white, pink or blue

10.

10. Perianth segments free, or united only at the base
 Perianth segments united, forming a short tube

11.

14.

11. Inflorescence usually branched; plant not bulbous, often with fleshy roots

1. *Asphodelus*

Inflorescence simple; plant always bulbous

12.

12. Flowers white, sometimes marked with green; filaments expanded

7. *Ornithogalum*

Flowers bluish or pink; filaments almost thread-like

13.

13. Plant without leaves at time of flowering, 60-150 cm high

8. *Urginea*

Plant with leaves present at the time of flowering, or plant less than 30 cm. high

6. *Scilla*

14. Flowers constricted immediately below the mouth

11. *Muscari*

Flowers not constricted at mouth

15.

15. Flowers 2 cm. or more long

9. *Hyacinthus*

Flowers 8-10 mm. long

10. *Bellevia*

1. *Asphodeus* L.

Herbs with radical leaves; without bulbs, roots often fleshy. Inflorescence racemose; flowers white. Perianth segments equal, joined only at the base; median nerve green or reddish. Stamens inserted at base of segments; filaments united to concave at base, enclosing the ovary. Anthers dorsifixed. Style uniform, with 3-lobed stigma. Capsule subglobose, 3-lobed, transversely rugose on valves. Seeds 2 or 1 by abortion in each loculus, ovoid, triquetrous, frequently rugose.

Plants small (30-50 cm. high); leaves slender, subulate; perianth segments 8-12 mm. long.
Plants tall (100-150 cm. high); leaves broad; perianth segments 13-16 mm. long.

1. *fistulosus*

2. *aestivus*

Berwieq zhir
Pink Asphodel

1. *A. fistulosus* L.

Plant rather slender, 30-50 cm. high, annual, biennial, or perennial, with slender fibrous roots. Leaves 15-30 cm. x 1-3 mm, semi-cylindrical, striate, linear. Stem branched or simple, with lax racemes; pedicels 4-7 mm. long, solitary, articulate towards the middle. Perianth segments 8-12 mm. long, linear-oblong, white or flesh-coloured, rotate, expanding when flowering. Capsule globose, with 2-3 ridges per valve. Fl. 2-5.

Subsp. *tennifolius* (Cav.) Trabut, is smaller with perianth segments 5-8 mm. long, and pedicels articulate below the middle.

Rocky sheltered places. *Malta*: Ballut tal-Wardija, Mistras Sufara (S. & C.G.; Borg; Wolseley); Kordin, Wied il-Kbir (S. & C.G.; Borg).

S. Europe; W. Asia; N. Africa; Atlantic Islands.

2. *A. aestivus* Brot.

Plate LIII

A. ramosus var. *aestivus* (Brot.) Fiori

A. microcarpus Viv.

Berwieq

Small-fruited Asphodel

Robust perennial 90-150 cm. high; roots tuberous, fusiform or napiform. Leaves 30-70 x (5-) 1-4 cm., broadly linear, deeply grooved, rigid. Stem branched; racemes rather dense; pedicels 10-14 mm. long, solitary, articulate towards middle. Perianth segments 13-16 mm. long, white, flesh-coloured or pale rose, with a darker vein. Capsule 6-8 mm. long, obovoid. Fl. 12-5.

Arid places and field margins. *Malta*, *Gozo* and *Comino*: common and locally abundant (S. & C.G.; Borg; G. Lanfranco; Haslam; Wolseley).

Mediterranean region.

2. *Aloe* L.

Plant with stiff perennating rosettes of leaves. Inflorescence racemose. Perigonum tubular-cylindrical, deeply divided into 6 segments. Stamens 6, hypogynous; style filiform, with small stigma. Capsule ovoid or oblong, with many compressed or angular winged seeds.

1. *A. vera* (L.) Burm. fil.

A. barbadensis Miller

Zabbara

Yellow Aloe

Stock thick, 30-60 cm. long, simple or occasionally branched. Leaves densely aggregated, ensiform, 45-65 x 6-10 cm., thick, concave on upper surface, acuminate

at margins, pale green, young plants regularly spotted with white. Scape 60-100 cm. long, simple or branched; racemes dense; flowers yellow, 2-3 cm. long, pendulous, shortly-pedicelled; bracts lanceolate. Fl. 4-6.

Rocky arid places. *Malta*: Ta' Baldu (S. & C.G.; Borg); Pwales (Zerafa; GD; Borg); Marfa peninsula (Reade; S. & C.G.; Borg; Wolseley); Buskett (Borg; Wolseley). *Gozo*: Ta' Ġenġ (S. & C.G.; Borg; Wolseley); Xlendi (Schweinfurth, Gullia). *Comino*: (Borg; Wolseley).

Native of east tropical and N. Africa. Cultivated in S. Europe, W. Asia and many tropical countries.

(*Aloe variegata* L., Variegated Aloe, a native of S. Africa, *Yucca filamentosa* L., Spoonleaf Yucca, *Yucca gloriosa* L., Handsome Yucca, and *Yucca filicoides* Haw., Thin-leaved Yucca, all natives of N. America are frequently cultivated and often met with half wild in old gardens (Borg).

3. *Colchicum* L.

Stock a corm. Leaves all radical. Flowers 1-3, arising from below ground level. Perianth segments all alike, united below into a long tube. Styles 3, filiform, inserted in the tube.

1. *C. cupani* Guss.

Plate LII

Buswieq tax-Xitwa

C. bertolonii Steven

Mediterranean Meadow Saffron

Corms small. Leaves 2-3, 6-10 cm. x 2-15 mm. long, linear-lanceolate, erect or falcate, ciliate on the margins, subequal to and emerging with the flowers. Flowers 1-4 (or more), white or pale pink; perianth segments c. $\frac{1}{4}$ as long as tube, straight, 5-7-nerved. Anthers dark. Styles suberect, more or less equal to stamens. Capsule 13-20 mm. long. Fl. 10-11.

Rocky arid places. *Malta*: common on the rocky plateaus of the north and north-west (S. & C.G.; Borg; Haslam; G. Lanfranco; Wolseley). *Gozo* and *Comino*: frequent (S. & C.G.; Borg).

Mediterranean region.

4. *Lilium* L.

Bulb of numerous, imbricate, fleshy scales, without a tunic. Leaves both radical and cauline numerous, alternate or whorled. Flowers large, solitary or in a terminal raceme, erect to nodding. Perianth of various shapes; segments spreading or revolute, caducous, with a longitudinal groove-like nectary at base. Anthers dorsifixed, versatile. Style long; stigma more or less 3-lobed. Seeds numerous, flat.

1. *L. candidum* L.

Gilju abjad

White Lily

Bulb large. Plant 60-120 cm. high, sweet-smelling. Leaves many, lanceolate, decreasing in size upwards. Flowers 5-20, in a short raceme, large, white, segments not much recurved. Fl. 4-5.

Malta and *Gozo*: long cultivated and often partly naturalised in old gardens (Borg).

Native of W. Asia; cultivated elsewhere.

5. Tulipe L.

Bulb with numerous scales and brown tunic; stem leafy. Flowers usually solitary, terminal. Perianth more or less campanulate or rotate, erect, segments more or less alike, without nectaries, caducous. Anthers basifixed. Style usually 6; stigma 3lobed. Seeds many, flat.

1. *T. australis* Link *T. sibiricus* var. *grandiflora* (Hf.) Fiori

Tulipan salvaeg
Southern Tulip

Stem 30-60 cm. high, glabrous, slightly glaucous. Leaves (usually 3 near base) 15-30 cm. x 6-12 mm., linear. Perianth 3-5 cm. long, yellow, greenish to reddish outside; segments opening widely in the sun. 2n = 48. Fl. 3-4.

Cultivated fields. *Malta*: very rare (G. Lanfranco), at Wied Qirnda, Wied Ineita (S. & C.G.; Borg).

S. Europe; naturalised in C. and N. Europe.

(*Tulipa oceanis*-sensu St. Amans. Eyed Tulip, with tunic of bulb densely woolly inside, and bright red flowers with black blotch at base of each segment. Is sometimes cultivated, and occasionally naturalised (Borg). *T. chusiana* Vent., White Tulip, was formerly naturalised in the San Anton gardens (Borg).)

6. Silba L.

Bulb with tunic. Leaves all radical. Inflorescence usually racemose. Perianth segments all alike, free, spreading, with a prominent midrib, usually blue or purple. Filaments inserted at base of perianth. Seeds ovoid or subglobose, sometimes angled, black.

1. Leaves not fully developed at time of flowering (autumn), ultimately to 2 mm. wide; very slender, up to 25 cm. high Leaves fully developed at time of flowering (spring), more than 1 cm. wide; stout or tall

1. autumnalis

2

2. Bracts much shorter than the pedicels or absent; perianth segments 4-6 mm. long Bracts, at least the lowest, subequal to the pedicels; perianth segments 10-14 mm. long

2. hyacinthoides

3. peruviana

1. *S. autumnalis* L.

Ghasal tax-xitwa
Autumn Squill

Bulb small. Leaves produced after flowering, 5-10, 4-15 x 1-2 mm., linear. Scape 4-65 cm. high. Raceme slender, 4-20-flowered; pedicels 2-30 mm. long, more or less ascending. Bracts 0. Perianth segments 4-6 mm. long, purple or pinkish, more or less oblong, more or less ascending. Filaments narrow, somewhat dilated below; anthers purple. Capsule c. 4 mm. long, loculi 2-seeded. 2n = 14, 28, 44. Fl. 9-10.

Arid, rocky places. *Malta* and *Gozo*: very common (S. & C.G.; Borg; G. Lanfranco; Ilkslan; Wolseley). *Comino*: (Borg).

Mediterranean region and W. Europe to N. France and S. England.

2. *S. hyacinthoides* L.

Ghasal salvaeg
Large Squill

Bulb rather large. Leaves completely developed while flowering, 1-3 cm. wide, linear-lanceolate, minutely ciliate at margin, shorter than scape. Scape 30-60 cm. high. Raceme rather long, about 50-100-flowered. Pedicels 1.5-2.8 cm. long, much longer than the short squamiform, or absent bracts; bracteoles very short. Flowers 4-6 mm. long, purplish-blue. Ovary with 3 furrows containing no seeds at the base. Fl. 3-6.

Sunny uncultivated places and margins of fields. *Malta*: Mellieha (Delicata; Borg); St. Paul's Bay, Wardija (Gulia; Borg). *Gozo*: Ta' Cené (Gulia; Borg).

Native of W. Asia; cultivated and naturalised in S. Europe.

3. *S. peruviana* L. *S. sicula* Thneo

Plate III

Ghasal ikhal
Mediterranean Squill

Bulb large. Leaves completely developed during flowering, 6-9, 2-3 cm. wide, lanceolate, minutely ciliate. Scape subequal to or shorter than leaves. Raceme corymbose-conical, 5-100 or more-flowered. Pedicels 4-6 cm. long, subequal to the slightly ciliate or glabrous bracts; one bracteole present on each pedicel, linear, whitish, well developed, at least 1 cm. long. Flowers 10-14 mm. long, dirty white in wild Maltese plants (var. *sicula* (Thneo) Fiori, sometimes white (var. *caerulea* (Guss.) or bluish-purple (var. *peruviana*) in cultivated plants.

Rocky places. *Malta*: local (G. Lanfranco), as at Haġar Qim, Wied Qirnda, Mellieha, Pwales, Wied Ineita, Binġemma (S. & C.G.; Borg); Wied il-Ghasal, Buskett (Borg); Wardija (Gaul); Misraħ Suffara, Victoria, lines near San Pawl tat-Tarġa (Wolseley). *Gozo*: Mgarr ix-Xini (S. & C.G.; Borg; Wolseley); Ta' Cené (Wolseley); Wied il-Ghasal (Kramer & Westra).

Mediterranean region.

7. Ornithogalum L.

Bulb with tunic. Leaves all radical. Inflorescence usually racemose. Perianth segments all alike, free, obscurely veined, persistent, usually white marked with green. Filaments flattened, hypogynous. Seeds ovoid or globular, numerous.

1. Inflorescence spike-like; flowers small, 10-12 mm. long Inflorescence corymbose; flowers large, 15-20 mm. long

3. pyramidale

2

2. Pedicels very unequal, the lower longer than the upper; petals white with green stripe on back; ovary green Pedicels more or less equal; petals completely white; ovary black

1. umbellatum

2. arabicum

1. *O. umbellatum* L. subsp. *divergens* (Boreau) P. Fourm.

Star-of-Bethlehem

Bulbs with rather numerous bulbils on outer tunic. Leaves 5-8 mm. wide, intersected by white lines in centre, glabrous, longer than the scape (including raceme). Scape 19-30 cm. high. Raceme subcorymbose, 6-20-flowered. Peduncles divaricate-reflexed in fruit; lower patent or subreflexed. 2 or 3 times as long as bracts. Perianth segments 17-20 mm. long, white inside, greenish with a darker band on the outside. Fl. 3-4.

Cultivated fields and field-margins. *Malta*: rare, Wied Qirda, Buskett (S. & C.G.; Borg); Wied Inčita (Borg).

Europe; Asia; N. Africa.

2. *O. arabicum* L.

Caruetia arabica (L.) C. Fresi

Halib it-Tajr

Large Star-of-Bethlehem

Bulb large, with bulbils. Leaves 20-25 mm. wide, linear, longer than scape. Scape 20-60 cm. high. Raceme rather short, corymbose, 6-12-flowered. Peduncles erect, patent, longer than bracts. Flowers large, scented; perianth segments c. 1.5 cm. long, oval, mucronate, ovary black. Fl. 4-5.

Cultivated fields and field margins. *Malta*: frequent (G. Lanfranco), as at Girgenti, Wied Babu, Wied Inčita (S. & C.G.; Borg); Victoria lines above Wied il-Ghasel (S. & C.G.); Borg; Wolseley; Mellieha (S. & C.G.; Borg; Kramer & Westra); Mosta (Wolseley); Wardija (Gauci). Gozo: Xlendi, Ta' Cenè (Borg). *Comino*: Sta. Marija Bay (Borg).

Mediterranean region; Atlantic Islands.

3. *O. pyramidale* L. subsp. *narbonense* (L.) P. Fourn.

Plate LIII

Southern Star-of-Bethlehem

Bulbs ovate, without bulbils. Leaves 5-12 mm. wide, linear, grooved, glaucous, shorter than the scape, persistent until after flowering. Scape 30-40 cm. high. Raceme oblong-cylindrical 20-50-flowered. Pedicels erect, erecto-patent. Perianth segments white with a green band on the back, oblong-lanceolate, obtuse. Fruit appressed, green, longer than the lanceolate-acuminate bracts. Filaments undivided. Fl. 3-5.

Cultivated fields and rocky places. *Malta* and Gozo: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley). *Comino*: frequent (Borg).

Mediterranean region; W. Asia; Atlantic Islands.

8. *Urginea* Steinh.

Bulbs with tunic. Leaves all radical. Flowers in racemes, white or pale pink; perianth segments free; filaments filiform, cylindrical or rarely flattened at base. Ovary with filiform style. Capsule membranous. Seeds many per loculus, flat with wing at margin.

1. *U. maritima* (L.) Baker

Għansal kbir

Giant Hyacinth

Bulbs large, 10-15 cm. in diameter. Leaves 30-50 cm. x 5-10 cm., more or less lanceolate, borne after flowering. Scape 60-150 cm. at base, $\frac{1}{4}$ as long as pedicels. Perianth segments ovate-oblong, white or pinkish with a green keel. Fl. 8-9.

Arid, rocky places. *Malta* and Gozo: very common (S. & C.G.; Borg; G. Lanfranco; Haslam; Wolseley). *Comino*: (S. & C.G.; Borg; Wolseley). *Cominotto*: (S. & C.G.; Borg). *Selmunett*: (Borg).

Mediterranean region; Atlantic Islands; S. Africa.

9. *Hyacinthus* L.

Bulb with tunic. Leaves all radical. Flowers blue or whitish; in a few-flowered raceme; perianth persistent, funnel-shaped or campanulate, tube at times contracted above ovary; segments 6, subequal to tube, or shorter, erect or recurved in flower. Stamens inserted in the tube or on throat of perianth.

1. *H. orientalis* L.

Għacinti

Garden Hyacinth

Scapes 20-30 cm. high. Leaves 10-15 mm. wide, linear, grooved, subequal to the scapes. Raceme lax, 4-10-flowered; pedicels much shorter than perianth; bracts scale-like. Flowers dark blue (in cultivated plants also white or pink), 2-3 cm. long. Perianth segments subequal to tube, curved; tube rather ventricose at base; stamens inserted in middle, enclosed. Fl. 3-4.

Cultivated and occasionally naturalised. *Malta*: Buskett and old gardens elsewhere (Borg).

Mediterranean region; widely cultivated elsewhere.

10. *Bellevalia* Lapeyr.

Bulb with tunic. Leaves all radical. Flowers greenish or purplish in a many-flowered raceme; perianth caducous, campanulate; tube not contracted above ovary; segments 6, usually shorter than tube, not recurved. Stamens inserted in the tube.

1. *B. romana* Reich.

Plate LIII.

Għacinti salvagg

Hyacinthus romanus L.

Roman Hyacinth

Leaves 5-15 mm. wide, linear, glabrous, grooved. Scape 15-30 cm. high, shorter than leaves. Raceme 20-30-flowered, conical at flowering. Pedicels subequal to perianth. Bracts scale-like. Flowers off-white, at first blue-tinged at base, c. 1 cm. long. Perianth segments linear-oblong, usually about $\frac{1}{2}$ as long as tube, suberect; tube somewhat ventricose at base. Stamens inserted in the throat. Capsule trigonous, subspherical. Fl. 3-4.

Cultivated fields especially on the Blue Clay. *Malta*: rare (G. Lanfranco), as at Mthleb, Buskett, Mdina (S. & C.G.; Borg); Mosta, Fawwara (Brenner and GD; Borg); Gnejna, Wied ta' l-Isqof (Wolseley); Chadwick Lakes and neighbourhood (Gauci).

Mediterranean region; from Southern France to Greece.

11. *Muscari* Miller

Bulb with tunic. Leaves all radical. Flowers in a raceme, upper sterile. Perianth more or less globular, strongly contracted at the mouth; segments all alike, lobes very small. Stamens inserted on tube, included.

1. Sterile flowers many, purple, on long purplish pedicels at top of raceme, fertile flowers brownish on short pedicels

1. *comosum*

Sterile flowers usually few, on short pedicels, fertile flowers blue or purplish

2.

2. Spring flowering; raceme dense; leaves longer than scape
 autumn flowering; raceme loose; leaves shorter than scape

2. *neglectum*
 3. *parviflorum*

1. *M. comosum* (L.) Müller Plate LVI Basal il-Hniezer
Leopoldia comosa (L.) Parl. Tassel Grape Hyacinth

Bulb with bulbils. Leaves 6-15 mm. wide. Scape 20-50 cm. high. Raceme long, lax; fertile flowers 7-8 mm. long, brown, spreading; sterile flowers purple, on long ascending pedicels. 2n = 18. Fl. 3-5.

Cultivated fields and waste places. *Malta*: common (S. & C.G.; Borg; G. Lanfranco; Haslam; Wolseley). *Gozo* and *Comino*: common (S. & C.G.; Wolseley).

Mediterranean region; C. & E. Europe.

2. *M. neglectum* Guss. Southern Grape Hyacinth
M. racemosum var. *neglectum* (Guss.) Fiori

Bulb with bulbils. Leaves 15-30 cm. x 3-5 mm., numerous, longer than or rarely subequal to scape, linear-junciform, grooved, flaccid. Scape 10-15 cm. high. Raceme short, dense, ovate, 12-30-flowered. Flowers scented, fertile intense blue-violet, pubescent on outer parts, some sterile, pale blue. Perianth 4-6 mm. long, ovate-oblong, urceolate, ovary trigonous. Fl. 3-4.

Cultivated fields and waste places. *Malta*: Wied Filep, Naxxar, San Pawl tat-Targa (S. & C.G.; Borg); Wied Ghomor, St. Julians (G.D.; Borg); N.W. of Malfar (A. Caruana).

C. and S. Europe; W. Asia; N. Africa.

3. *M. parviflorum* Desf. Lesser Grape Hyacinth

Leaves 10-20 cm. x 1-2 mm., linear-filiform, semi-cylindrical, grooved, flaccid, shorter than the scape. Raceme 3-6 cm. long, 6-12 (-20)-flowered; the sterile ones usually 0 or few. Perianth 2-7 mm. long, ovoid, urceolate, pale blue, with coloured teeth, faintly scented. Fl. 9-10.

Cultivated fields and rocky ground. *Malta*: frequent (G. Lanfranco), as at Wied Inčita, Wied Ghomor, Marsaxlokk, Wied Għar Dalam, Buskett, Minsija, Mtaħleb, Wied il-Għasei (S. & C.G.; Borg); Bahrija (Borg).

Mediterranean region.

12. *Allium* L.

Stock usually a bulb with tunic, scales sometimes tubular. Plant smelling of onion or garlic. Leaves all radical, but often partly sheathing the stem. Inflorescence an umbel, enclosed before flowering in a spathe, splitting at flowering and forming 1 or more involucre bracts. Perianth campanulate or rotate; segments free or nearly so. Ovules 2 or more in each loculus. Seeds black. Bulbils often present between the flowers, sometimes replacing them.

1. Leaves hollow or semicylindric, at least near the base
 Leaves solid or flat

2. Inner and outer stamens almost alike, all simple
 Inner stamens much broader at base than outer stamens

3. Many bulbils on inflorescence; flowers few
 Bulbils on inflorescence very rare; flowers many

4. Flowers pale pinkish; perianth segment acute
 Flowers usually greenish-white; perianth segments obtuse

5. Stem slender; flowers reddish-purple
 Stem inflated; flowers whitish

6. Inner stamens simple
 Inner stamens much broader than outer

7. Leaves ciliate
 Leaves glabrous or denticulate

8. Stem apparently absent; flowers at ground level
 Stem 20-50 cm. high

9. Perianth segments pinkish, at least on the veins; stamens $\frac{1}{2}$ as long as perianth
 Perianth segments white; stamens $\frac{1}{2}$ as long as to as long as perianth

10. Perianth segments obtuse; stamens $\frac{1}{2}$ as long as perianth
 Perianth segments acute; stamens equalling perianth

11. Leaves smooth
 Leaves rough; denticulate

12. Leaves setaceous; flowers pinkish; late-summer flowering
 Leaves 0.5-1.0 cm. wide, flat; flowers white; spring-flowering

13. Scape angled; flowers always white
 Scape cylindrical; flowers pink, purplish or white

14. Leaves 2-5 cm. wide, flat, corolla rotate
 Leaves 0.5-1.2 cm. wide, canaliculate; corolla more or less campanulate

15. Flowers pink
 Flowers white, yellowing when dry

16. Bulbils not present on inflorescence
 Bulbils present on inflorescence

17. Leaves smooth; spathe longer than umbel, 1-valved
 Leaves rough, denticulate; spathe shorter than umbel, 2-valved

18. Leaves smooth; spathe longer than umbel, 1-valved
 Leaves rough, denticulate; spathe shorter than umbel, 2-valved

19. Leaves smooth; spathe longer than umbel, 1-valved
 Leaves rough, denticulate; spathe shorter than umbel, 2-valved

20. Leaves smooth; spathe longer than umbel, 1-valved
 Leaves rough, denticulate; spathe shorter than umbel, 2-valved

1. *A. cepa* L.

Tewma bajda
Garden Onion

Plant robust. Bulb usually solitary. Leaves more or less semicircular in section, slightly channelled. Scape inflated, fusiform below the middle. Umbel many-flowered, usually without bulbils, pedicels 4-5 times as long as the flower. Flowers greenish-white. Perianth segments 4-5 mm. long. Inner filaments with a small tooth on each side. $2n = 16, 32$, Fl. 4-6.

Cultivated as a vegetable for home consumption and export. *Malta*, *Gozo* and *Comino*: common (Borg; Wolseley).

Native of W. Asia; commonly grown as a vegetable in many parts of the world.

2. *A. sphaerocephalon* L.
A. descendens auct.

Tewm Kahlani
Round-leaved Leek

Bulb without bulbils, external tunic entire. Leaves carinate-triangular, grooved hollow at least below, linear. Scape 15-150 cm. high, leafy to halfway. Spathe ovate, 1-valved more or less entire or 2-3 lobed or partite at apex, caducous or rarely persistent. Umbel globose when young, later as if composed of 2 umbels, lower flowers sterile, pendulous, central fertile and more or less erect with long pedicels. Outer flowers and pedicels subequal, without bulbils. Perianth segments sometimes scabrid on back. Stamens usually protruding; filament more or less equalling lateral teeth. Fl. 5-6.

Arid rocky places. *Malta*: rare, Wied Żnuber, Wied Hanżir (S. & C.G.; Borg; Benghisa (GD.; Borg); Kordin, Bahrija, Wardija (Gulia; Borg); Ramla tat-Torri and Marfa neighbourhood (Gauci).

Europe; W. Asia; N. Africa.

3. *A. oleraceum* L.

Field Garlic

Bulb ovoid, usually with offsets. Leaves 15-30 cm. x 2-3 mm., semi-terete, grooved, (or flat and up to 4 mm. wide), hollow, at least below. Scape 25-80 cm. high, cylindrical, sheathed in lower half. Spathe with 2 subequal valves, with long leaf-like points much longer than flowers. Umbels lax, few-flowered, pedicels unequal, longer than flowers. Perianth campanulate; segments 5-7 mm. long, oblong, obtuse. Stamens included in perianth; filaments simple. $2n = 32$, Fl. 5-6.

Probably not in the Maltese Islands, but it is not clear from Borg's statement whether it is sometimes cultivated and naturalised.

Much of Europe; W. Asia.

4. *A. tenuiflorum* Ten.
A. paniculatum var. *tenuiflorum* (Ten.) Regel
A. oleraceum var. *tenuiflorum* (Ten.) Fiori

Narrow-flowered Garlic

Like 3, but scape 15-25 cm. high; spathe subequal to umbel; flowers pale pinkish; perianth cylindrical-campanulate, with segments linear-oblong, acute. Fl. 5-7.

Malta: Bahrija (Gulia; Borg).

Spain; Italy; Sicily.

5. *A. paniculatum* L.
A. oleraceum var. *paniculatum* (L.) Fiori

Tewm safran
Pale Garlic

Bulb ovoid, outer tunic membranous. Leaves semicylindrical, grooved to cylindrical below. Scape 20-90 cm. high, leafy for half or more of its length, shorter than leaves. Spathe 3-20 cm. long, subequal or longer than umbel. Umbel diffuse, without bulbils, with unequal pedicels, 12-many-flowered. Flowers white, greenish, pink, or reddish. Perianth conical-campanulate, segments oblong, obtuse, emarginate or mucronate. Stamens included; filaments simple. Fl. 5-6.

Cultivated and waste places. *Malta*: frequent (G. Lanfranco) as at Baskett (S. & C.G.; Borg); Girgenti, Mtaħleb (S. & C.G.; Borg; Wolseley); Wied Rabu (GD.; Borg); Wied Gerżuma, Gnejna (Gulia; Borg; Wolseley); Ghajn il-Kbir, Ghajn Tuffieħa (Borg); Wardija (Borg; Wolseley). *Gozo*: Nadur, Mgarr (Borg).

Europe; W. Asia; N. Africa.

6. *A. chamaemoly* L.

Tewm gergni
Dwarf Garlic

Bulbs small, ovate. Leaves 3-4, 2-10 x 0.2-0.8 cm., linear, flat or slightly grooved, ciliate or villose, much exceeding umbel, usually appressed to ground. Scape 1-4 cm. high, straight from ground. Spathe 2-4-lobed, hyaline; pedicels about twice as long as flowers, recurved in fruit. Flowers small, white. Perianth segments 7-8 mm. long, linear-oblong, obtuse. Fl. 12-1.

Arid rocky places. *Malta*: locally frequent (G. Lanfranco) as at Floriana fortifications, Manoel Island, Kordin, Bingham (S. & C.G.; Borg); Wied Inčita, Baskett, Faqqanija, Dingli (Borg); Wied Ghomor, Kuncizzjoni (Gauci). *Gozo*: Nadur, Wied ir-Rihan (S. & C.G.; Borg).

Mediterranean region.

7. *A. parviflorum* Viv.

Few-flowered Garlic

Bulbs ovate, outer tunic membranous. Scape 10-30 cm. high, flexuous, sheathed over much or all of its length. Leaves cylindrical, filiform, grooved, exceeding scape, dying at flowering. Spathe tubular below, bifid above, shorter than umbel. Umbel 3-12-flowered, lax; pedicels unequal, up to 2.5-3.0 cm. long. Flowers rosy-purple. Perianth segments c. 5 mm. long, lanceolate, acute. Stamens enclosed; filaments simple. Fl. 6-7.

Arid rocky places. *Malta*: rare (G. Lanfranco), as at St. Andrews, Marfa (S. & C.G.; Borg); Baħar ič-Ġaħaħ, Mgħatab, Buġibba, Salini (Borg). *Gozo*: Wardija (S. & C.G.; Gulia; Borg); Nadur, Żebbuġ (Borg). *Comino*: (Borg).

Italy, Corse, Sardegna.

8. *A. sativum* L.

Tewm
Garlic

Bulb with bulbils, tunic membranous. Leaves linear, flat, not scabrid. Scape 20-40 cm. high. Spathe 1-valved, with long point, much longer than umbel. Flowers whitish, mixed with bulbils. Perianth campanulate, segments lanceolate, acute. Stamens included; inner filaments with 2 teeth equalling the body. Fl. 6-8.

Malta, Gozo and Comino: extensively cultivated, rarely self-sown from dropped bulbils (Borg).

Native of C. Asia; cultivated for flavouring in many parts of the world.

9. *A. scorodoprasum* L.

Fewm ta' ras hozna
Sand Leek

Bulb with offsets. Leaves 15-20 x 0.7-1.5 cm. linear, flat, scabrid on margins and keel. Scape 30-80 cm. high, rather slender. Spathe 2-valved, shorter than umbel. Umbels with few flowers and purple bulbils. Perianth campanulate, reddish-purple, segments 5-8 mm. long, oblong-lanceolate, scabrid on keel. Stamens included, body of inner filament much shorter than its teeth and about half as long as undivided part. $2n = 16, 24$. Fl. 5-6.

Malta and Gozo: cultivated in a few places (Borg).

Much of Europe; W. Asia.

10. *A. ampeloprasum* L.

Kurrat salvagg
Wild Leek

Bulb with offsets inside the tunic. Leaves 15-60 x 12-3.5 cm., distichous, linear, keeled, their bases sheathing at least in the lower $\frac{1}{2}$ of the stem. Scape 60-200 cm. high, cylindric stout. Spathe scarious, 1-valved, with a compressed beak, caducous before flowering. Umbels 7-10 cm. in diameter, many-flowered, compact, globose. Perianth campanulate, pale purple or whitish; segments c. 8 mm. long, connivent, acute. Stamens slightly exserted; teeth of inner filaments much longer than the body. $2n = 32$. Fl. 4-5.

Var. *melitense* Sommier & Caruana-Gatto differs from the type in its scape being usually less than 25 cm. high, with narrower leaves, umbels about 3 cm. in diameter, hemispherical, and filaments of inner stamens narrower at the base.

Rocky places, especially near the sea. *Malta, Gozo, Comino and Cominotto*: frequent (S. & C.G.; Borg; G. Lanfranco). *Filfla*: (S. & C.G.; Borg; G. Lanfranco). *Filfla*: (S. & C.G.; Borg). *Selmunett*: (Borg).

Mediterranean region; Atlantic Islands.

A. porrum L. (*A. ampeloprasum* var. *porrum* (L.) Regel), Garden Leek, differs primarily from wild *A. ampeloprasum* in the bulb being usually without offsets and sheaths very fleshy at base. $2n = 32$.

Commonly cultivated as a vegetable (Borg) and evidently derived in the far distant past from *A. ampeloprasum*.

11. *A. subhirsutum* L.

Plate LII

Tewm muswaf
Hairy Garlic

A. subhirsutum var. *typium* Regel

A. subhirsutum var. *ciliatum* (Cyr.) Briquet

Bulbs globose, tunic pale, with bulbils. Leaves 2-8 mm. wide, linear, flaccid, acuminate, grooved, carinate, ciliate, usually shorter than scape. Scape 20-50 cm. high, cylindrical. Umbel few or many-flowered, with bulbils. Spathe short, ovate-acuminate, 2-3-lobed; pedicels 1-3 cm. long. Perianth segments 6-9 mm. long, white, oblong-lanceolate, obtuse. Stamens simple, $\frac{1}{2}$ as long as perianth. Fl. 3-5.

Rocky places, fields and waste places. *Malta and Gozo*: very common (S. & C.G.; Borg; Wolseley). *Comino*: (Borg).

Mediterranean region; W. Asia; Ethiopia; Atlantic Islands.

12. *A. subvillosum* Salzm. ex Schultes & Schultes fil.

Spring Garlic

A. vernale Tineo

A. subhirsutum var. *subvillosum* (Salzm.) Fiori

Like *A. subhirsutum*, but pedicels more rigid, perianth segments oval-oblong, acute, and stamens more or less equal to the perianth. Fl. 3-4.

Malta: rare at Wied Gerzuma (Borg). *Gozo*: hill of Ta' Harrax (Gulia; Borg).

W. Mediterranean region.

13. *A. trifoliatum* Cyr.

Pink Garlic

A. subhirsutum var. *trifoliatum* (Cyr.) Fiori

A. subhirsutum var. *gracum* (D'Urv.) Regel

Like *A. subhirsutum*, but perianth segments lanceolate, acute, pinkish at least on the keel, and stamens $\frac{1}{2}$ as long as perianth. Fl. 3-4.

Malta and Gozo: frequent but less so than *A. subhirsutum* (S. & C.G.; Borg). *Comino*: (Gulia; Borg).

E. Mediterranean region.

14. *A. neapolitanum* Cyr.

White Garlic

Bulb sub-globose, with bulbils, tunic pale. Leaves 7-20 mm. wide, with a weak keel, glabrous, finely toothed on the edge. Scape erect, 20-40 cm. high, with 2 angles acute and one obtuse. Umbel many-flowered. Spathe 1-valved, ovate, acuminate. Pedicels 1.5-4 cm. long, erect or patent. Flowers milk-white. Perianth segments 10-14 mm. long, elliptical-ovate, obtuse. Stamens $\frac{1}{2}$ length of perianth; filaments simple. Fl. 3-4.

Cultivated and occasionally naturalised in cultivated areas. Possibly indigenous. *Malta*: Wied Ballut (GD.; Borg); Marsaskala, Ghar Hassan, Wied Blandun, Cottonera, Bahrija (Gulia; Borg). *Gozo*: Xlendi, Pergla (Gulia; Borg).

Mediterranean region.

15. *A. triquetrum* L.

Three-cornered Garlic

Bulb small, whitish. Leaves 2-5, distichous, linear, strongly keeled, almost basal. Spathe shorter than the pedicels, with 2 lanceolate valves. Inflorescence 3- to 15-flowered, without bulbils; pedicels longer than flowers. Perianth more or less campanulate; segments 12-18 mm. long, connivent after flowering, white with a green stripe. Filaments simple, slender, unequal, connate at the base with the perianth segments. Stigma trifid. Seeds with aril, dispersed by ants. $2n = 28$. Fl. 12-4.

Sheltered places. *Malta*: rare, Buskett (Kerr; S. & C.G.; Borg); Wied Gerzuma, Wied il-Baruni (Gulia; Borg). *Gozo*: Xlendi, Mgarr (Gulia; Borg).

W. Mediterranean region; naturalised elsewhere.

16. *A. roseum* L.

Tewm Hamrani
Rose Garlic

Bulb with numerous bulbils. Leaves 2-4, 4-12 mm. wide, linear, flat, almost basal. Scape 30-60 cm. high, cylindrical. Spathe 2-4-valved, scarious, shorter than the pedicels. Pedicels 2-3 times as long as flower. Perianth pink, campanulate; segments 10-12 mm. long, spreading, elliptic-oblong, becoming scarious. Fl. 3-4.

Two subspecies occur. Subsp. *roseum* has the umbel without bulbils. $2n = 32$. Subsp. *bulbiferum* (DC.) E.F. Warburg has flowers and bulbils in the umbel. $2n = 48$.

Rocky ground, fields and waste places. *Malta*: frequent (S. & C.G.; Borg; Welseley). *Gozo*: less frequent, Xlendi, Wied Qorrot (S. & C.G.; Borg); Sannat, Mgarr ix-Xini (Borg). *Comino*: (Borg; Welseley).

Mediterranean region; Atlantic Islands.

17. *A. pernix* Guss.

Mediterranean Garlic

- A. subhirsutum* var. *glabrum* Regel
A. roseum var. *graminifolium* (Lois.) Fiori
A. roseum var. *brachystemon* Red.

Bulb globose, with bulbils. Leaves 2-8 mm. wide, linear, glabrous, denticulate, flaccid, acuminate, grooved, keeled, usually shorter than scape. Scape 10-50 cm. high, cylindrical, Spathe short, ovate-acuminate, 2-3-lobed; pedicels 1-3 cm. long. Flowers white when fresh, yellowish when dry. Perianth segments 9-13 mm. long, elliptic-oblong, sometimes denticulate at apex. Stamens $\frac{1}{2}$ length of perianth. Style twice as long as stamens.

Rocky places. *Gozo*: Ta' Ġenè (Gulia; Borg).

Mediterranean region.

18. *A. nigrum* L.

Čuplaj
Black Garlic

Bulb large, subglobose, tunic entire. Leaves 2-4, denticulate, lanceolate. Scape 40-80 cm. high, cylindrical, robust. Spathe 2-4 lobed, ovate. Pedicels 2-3 cm. long. Perianth segments 6-8 mm. long, lanceolate, white or tinted rose, reflexed in fruit. Stamens simple. Fl. 4-5.

Var. *multibulbosum* Jacq. has the bulb with bulbils, leaves glaucous and broader; and perianth segments more acute.

Cultivated fields especially on the clay. *Malta*: common especially in the south and west (S. & C.G.; Borg; G. Lanfranco; Welseley). *Gozo*: common (S. & C.G.; Borg; Welseley).

Mediterranean region; Atlantic Islands.

13. *Nothoscordum* Kunth

Resembles *Allium*, but plant without onion smell; perianth usually campanulate, segments joined at base into a short tube; ovules 4-12 in each loculus.

1. *N. inoderum* (Ait.) Nicholson
N. fragrans (Vent.) Kunth
Allium fragrans Vent.

Tewm tal-qsari
Sweet Garlic

Bulb subglobose. Leaves 25-30 cm. x 5-15 mm., linear, mostly basal. Scape 20-40 cm. high. Spathe 2-valved. Inflorescence many-flowered, lax, without bulbils.

Flowers scented. Perianth segments 8-14 mm. long, elliptic, dull white with a greenish base and reddish midrib outside. Stamens included, almost equalling the perianth. $2n = 16, 18, 24$. Fl. 4-9.

Cultivated and naturalised, often becoming a troublesome weed. *Malta*: Lija, Balzan, Attard, Birkirkara, Mosta (Borg). *Gozo*: Mgarr (Borg).

Native of N. America; naturalised in many parts of the Old World.

14. *Asparagus* L.

Stock a rhizome. Stems erect or climbing, sometimes woody, much branched. Leaves reduced to small scarious scales, bearing 1 or more cladodes in their axils. Flowers axillary, not borne on cladodes. Pedicels articulated. Perianth segments free or nearly so. Stamens free. Anthers introrse, dorsifixed. Ovules few. Fruit a berry.

- | | | |
|--|------------------------|----|
| 1. Cladodes ovate, acute; stems with simple branches | 3. <i>asparagoides</i> | 2. |
| Cladodes needle-like; stems with compound branches | | |
| 2. Stems annual, not woody; cladodes soft | 1. <i>officinalis</i> | |
| Stems perennial, woody; cladodes rigid | 2. <i>aphyllus</i> | |

1. *A. officinalis* L.

Spragg
Wild Asparagus

Perennial. Stem 50-150 cm. high, annual, with smooth cylindrical branches. Leaves scale-like, shortly spurred at base. Cladodes 6-25 mm. long, delicate, needle-like, in cluster of 3-10. Pedicels in groups of 1-3, articulate a little above $\frac{1}{2}$ way up stem. Flowers dioecious, campanulate; perianth 5-7 mm. long; female flowers rather shorter than male. Berry 6-10 mm. wide, red, large. Fl. 4-6.

Malta and *Gozo*: Cultivated and occasionally naturalised (Borg).

S. & C. Europe; W. & C. Asia; N. Africa; cultivated in other temperate regions.

2. *A. aphyllus* L.

Plate LVI

Spragg Kowwici
Mediterranean Asparagus

Plant suffruticose, with rigid, angular, scabrid branches. Cladodes 7-10 mm. long, solitary or in clusters of 2-6, needle-like. Leaves scale-like, lower shortly spurred at base. Perianth 15-25 mm. long, solitary or paired, recurved. Berry 8-10 mm. wide, blackish. Flowers monoecious (hermaphrodite or bisexual) or dioecious. Fl. 8-10 and 3-5.

Rocky sheltered places. *Malta*, *Gozo* and *Comino*: very common (S. & C.G.; Borg; G. Lanfranco; Haslam; Welseley). *Cominotto*: (S. & C.G.; Borg).

Mediterranean region; Atlantic Islands.

3. *A. asparagoides* (L.) Druce

African Asparagus

A. madoeloides (L. fil.) Thunb.

Climbing perennial with very long, green stems, branches axillary. Cladodes 8-20 mm. wide, solitary, ovate-acute, subcoriaceous, roundish at base. Leaves scale-like, not spurred. Flowers hermaphrodite, in groups of 1-4; pedicels articulate at the middle. Perianth 4-6 mm. long; segments reflexed. Berry globose. Fl. 3-4. Cultivated and occasionally naturalised. *Malta*: San Anton Gardens, Casa Leon, Buskett (Borg).

Native of S. Africa; cultivated elsewhere.

15. *Ruscus* L.

Stems erect. Flowers solitary or in a cluster on the surface of the cladode. Flowers dioecious. Inner perianth segments smaller than outer. Stamens 3. Style short. Perianth persistent.

1. *Ruscus hypophyllum* L.

Belladonna
Large Butchers-broom

Stem 40-80 cm. high. Leaves inserted in the middle of the under surface of the cladode. Flowers 2-5 in a cluster just above the middle of the upper surface of large, oblong cladode. Fl. 12-4.

Malta: cultivated for ornament, naturalised at Buskett, Ghajn il-Kbira and Girdenti (Borg).

Mediterranean region.

(*Ruscus aculeatus* L., Butchers-broom, is frequently cultivated according to Borg.)

16. *Smilax* L.

Stock a rhizome. Stems climbing, sometimes woody. Normal leaves present. Flowers dioecious; male with 6 stamens; female with oblong, 3-locular ovary with 1-2 ovules per loculus; stigmas 3; sessile; perianth segments 6, the outer 3 larger. Berry globose, seeds 1-3.

1. *S. aspera* L. Plate LVI

Includ. var. *mauritanica* Poiret

Salsa pajzana
Mediterranean Smilax

Woody climber; branches angular, flexuous, aculeate. Leaves coriaceous, hastate or cordate at base, frequently aculeate on margins and nerves, sometimes white or black-spotted, with tendrils inserted on base of petiole. Flowers white in sessile umbels. Berry red, globose. Fl. 9-11.

Rocky sheltered places. *Malta* and *Gozo*: frequent (S. & C.G.; Borg; G. Lanfranco; Haslam; Wolseley).

Mediterranean region; W. & C. Asia; Ethiopia; Atlantic Islands.

C. AGAVACEAE

Perennials with thick rhizomes and fibrous roots; sometimes trees. Leaves often spiny, tough, leathery. Scape many-flowered. Perianth 6-lobed; corona never present. Stamens 6.

1. *Agave* L.

Stem short; leaves crowded in a basal rosette, very fleshy and prickly. Flowers hermaphrodite, in huge panicles. Perianth persistent, actinomorphic. Stamens exserted. Ovary inferior.

1. *A. americana* L.

American Agave

Rhizomes creeping, forming new rosettes. Leaves 150-200 cm. long, linear-lanceolate, glaucous, fleshy, mucronate, spiny on the margins. Inflorescence vast, 6-8 m. long, with horizontal branches. Flowers yellow; perianth narrowly tubular with 6, lanceolate segments. Stamens long exserted with versatile anthers.

Cultivated for ornament, sometimes naturalised. *Malta*: naturalised at Buskett (Borg; Haslam); Addolorata Cemetery, Blata l-Bajda, Mellieha, Mdina (Borg); Għal

lis, St. Andrews (Haslam; Wolseley); Bur Marrad (Wolseley). *Gozo*: Mgarr, Xlendi (Borg; Wolseley). *Comino*: (Borg; Wolseley).

Native of N. America; widely planted for ornament.

CI. AMARYLLIDACEAE

Herbs with radical leaves. Inflorescence usually umbellate or 1-flowered, initially enclosed in a spathe. Flowers hermaphrodite, 3-merous, usually actinomorphic. Perianth petaloid, in 2 whorls, sometimes with a corona. Stamens opposite perianth segments. Stigma capitate or 3-lobed; ovary inferior, 3-celled with axile placentation; ovules usually numerous, in 2 rows on each placenta, anatropous. Fruit a capsule, rarely a berry.

Corona formed by expanded filaments
Corona separate from filaments

1. *Paneratium*
2. *Narcissus*

1. *Paneratium*

Perennials with bulbs. Umbel 3- to 15-flowered. Perianth infundibuliform, with a long tube, and 6 erect laciniae. Stamens 6, inserted on throat; filaments united at base by petaloid lamina which forms a corona. Style filiform with simple stigma. Capsule subglobular-trigonal.

1. *P. maritimum* L.

Plate LVI

Pankrazju salvaġġ
Sea *Paneratium*

Bulb large. Leaves 10-15 mm. long, linear, spirally twisted, subequal to the scape, glaucous. Scape 20-40 cm. high, large, compressed. Flowers 3-10, subsessile, white, strongly scented; perianth 10-13 cm. long, tubular at base; segments linear-lanceolate; corona large, campanulate with 12 triangular teeth. Fl. 7-10.

Maritime sands. *Malta*: local (G. Lanfranco), as at Marfa peninsula, Mellieha, St. Paul's Bay (S. & C.G.; Borg; Wolseley); Salini, Ahrax (G.D.; Borg); Qnejna, Ghajn Tuffieha (Borg). *Gozo*: Ramla (S. & C.G.; Borg; Wolseley); Qbajjar (Borg). *Comino*: (G.D.; Borg).

Mediterranean region.

2. *Narcissus* L.

Bulbous perennials. Flowers solitary or several, usually horizontal. Perianth segments all alike, usually spreading; corona trumpet-like or ring-like, inserted between the perianth segments and stamens; tube distinct.

1. Flowers solitary
- Flowers 2-20 per stem

2. Perianth white; corona yellowish
- Perianth pale yellow; corona deep yellow

3. Perianth golden yellow
- Perianth white, cream or pale yellow

4. Perianth and corona pure white; inflorescence nearly upright
- Perianth cream or yellowish, corona yellow, inflorescence drooping

7. *serotinus*
2. *x incomparabilis*
4. *aureus*
6. *papyraceus*

5. Flowers 20-40 mm. in diameter; perianth cream-coloured, corona yellow
Flowers c. 40 mm. in diameter; perianth yellowish-white, corona pale yellow

3. tazetta
5. italicus

1. *N. serotinus* L.

Rangis iruwanhar
Lesser Narcissus

Bulb small, with a blackish tunic. Leaves linear, cylindrical with a groove on the upper side. Scape 10-20 cm. high, cylindrical, 1-flowered. Perianth 2-3 cm. in diameter, segments oblong or oblong-linear, acute, mucronate, white; corona 3-6 mm. long, yellowish. Stamens unequal, 3 low-inserted and 3 high with short filaments. Fl. 9-11.

Rocky, arid places. *Malta*: locally common (G. Lanfranco, Haslam); Wied Inċita, Marsaxlokk, St. Paul's Bay, Wied Gerżuma, Buskett (S. & C.G.; Borg); Salini (S. & C.G.; Borg; Haslam); Kordin (Duthie; Borg); Dingli; Ta' Lawrence; Tal-Għolja, Wardija, Pwales, Mellieħa, Ahrax, Golden Bay (Borg); St. Andrews to Għallis (Haslam). *Gozo*: Ta' Ġenċ, Nadur (Borg). *Comino*: (Borg).

Mediterranean region.

2. *N. x incomparabilis* Miller

Garden Narcissus

Leaves 3-15 mm. wide, glaucous. Flowers solitary. Perianth 4-6 cm. in diameter, pale yellow; corona 8-12 mm. long, deep yellow, cup-shaped, about half as long as perianth.

Similar plants have the perianth varying in colour from white to deep yellow and the corona from very pale yellow to reddish-orange.

Malta: frequently cultivated and sometimes naturalised (Borg).

3. *N. tazetta* L.

Plate LVI

Rangis, Narcis
Cream Narcissus

Leaves 3-15 mm. wide, ribbon-like, flat or grooved, glaucous to greenish. Scape 20-30 cm. high, angular-cylindrical or compressed. Flowers 20-40 mm. in diameter, 2-12, in a drooping cluster, sweet-scented, cream-coloured, outer segments shorter than the long, narrow tube; corona yellow, $\frac{1}{2}$ to $\frac{1}{3}$ the length of the outer segments, sometimes subcrenate. Stamens unequal, 3 inserted low, 3 inserted high in tube; filaments very short. Fl. 10-3.

Fields, valleys and uncultivated rocky places. *Malta* and *Gozo*: common (S. & C.G.; Borg; Haslam; G. Lanfranco; Wolseley). *Comino*: (Borg; Wolseley).

Mediterranean region; cultivated elsewhere.

4. *N. aureus* Loeb.

Golden Narcissus

Stem 20-40 cm. high. Leaves 10-15 mm. wide, flat, green. Flowers 8-12, in an upright cluster, about 30 mm. in diameter, golden-yellow, often scented; corona bright yellow, entire, about a third as long as outer perianth segments.

Malta: frequently cultivated and sometimes naturalised (Borg).

Mediterranean region.

5. *N. italicus* Ker-Gawler

Italian Narcissus

Stem 30-50 cm. high. Leaves 10-15 mm. wide, channelled, green. Flowers 5-12, in a drooping cluster, about 40 mm. in diameter, sometimes scented, yellowish-white; corona pale yellow, slightly dentate.

Malta: frequently cultivated and sometimes naturalised (Borg).

Italy, Sardegna.

6. *N. papyraceus* Ker-Gawler

White Narcissus

Stem 30-50 cm. high. Leaves 8-15 mm. wide, channelled, glaucous. Flowers 5-20, in a nearly upright cluster, 30-40 mm. in diameter, sweet-scented, pure white, tube green at base, white above; corona white, quarter the length of the outer perianth segments.

Malta: frequently cultivated and sometimes naturalised (Borg).

Mediterranean region.

III. DIOSCOREACEAE

Usually slender, herbaceous or woody twining with tuberous rhizomes or stocks or thick woody stem-tubers. Leaves usually spirally arranged, often cordate, with palmate main veins and a network of smaller veins. Flowers small; unisexual (usually dioecious), actinomorphic, epigynous. Perianth of 3 + 3 more or less equal segments united below into a short tube; stamens 3 + 3, or 2 with or without staminodes, replacing the missing set, in female flowers rudimentary or 0; styles 3, or 1 with 3 stigmatic lobes; ovary in female flower inferior, 3-locular, rudimentary or 0 in male flowers. Fruit a 3-valved capsule or berry; seeds often flattened or winged.

1. *Tamus* L.

Perennial, dioecious herbs. Stems slender, annual, twining. Leaves entire, cordate. Flowers small, axillary. Perianth campanulate. Stamens 6; style 1, with 3, 2-lobed stigmas. Fruit a berry.

1. *T. communis* L.

Plate LVI

Black Bryony

Tall herb with large blackish tuber up to 20 cm. or more long, and 10-20 cm. below the soil surface. Stems 2-4 m. long, twining to the left. Leaves 3-10 x 2.5-10 cm., dark shining green, with 3-9 main veins; stalk long, with 2 stipule-like emergences at base. Flowers in racemes, yellowish-green; male stalked, 5 mm. diameter; female subsessile, recurved, 4 mm. in diameter. Berry c. 12 mm., ovoid-ellipsoidal, pale red, glabrous. $2n = 48$. Fl. 4-5.

Among shrubs. *Malta*: rare, Mistra, Gnejpa (S. & C.G.; Borg); Għajn Tuffieħa (Borg); Mellieħa (Kramer & Westra). *Gozo*: valley bottom at Għajr ix-Xini (C. & C.G.; Borg; Penza; Mistra rocks (I.M. Evans).

S., W. and C. Europe; N. Africa; S.W. Asia.

III. IRIDACEAE

Perennial herbs with rhizomes, corms or bulbs. Leaves not differentiated into lamina and petiole. Flowers 3-merous, hermaphrodite, actinomorphic or weakly zygomorphic, usually with 1-2 bracts forming a spathe below. Perianth 2-whorled, petaloid; segments usually connate at base. Stamens 3; style 3-lobed, branches

entire or divided, sometimes petaloid; stigmas terminal or on underside of branches; ovary inferior, 3-celled with axile placentas or 1-celled with 3 parietal placentas. Fruit a capsule.

1. Flowers actinomorphic, usually few on a spike
Flowers zygomorphic, in a many-flowered spike
2. Stigma lobes petaloid; outer perianth segments different to inner
Stigma lobes not petaloid; outer perianth segments similar to inner
3. Stem colourless, more or less absent at flowering; perianth tube long
Stem green, present at flowering; perianth tube short
4. Style branches simple
Style branches bifid
5. Flowers bright red; perianth tube slender
Flowers yellow; perianth tube broad

1. Iris L.

Perennial herbs with sympodial rhizomes or bulbs. Leaves flat, long and narrow widest in middle, tapering at tip, often distichous. Flowers large, actinomorphic, outer perianth segments usually deflexed and larger than inner ones, which are often erect, with limb and claw; tube short. Style branches broad, petaloid, bifid at tip. Capsule trigonous.

1. Plant bulbous
Plant rhizomatous.
2. Tunic reticulate; filaments fused with the style
Tunic membranous; filaments free
3. Perianth tube shorter than ovary, segments without beard
Perianth tube longer than ovary, segments with beard
4. Flowers purple; perianth segments lanceolate
Flowers yellow; perianth segments ovate
5. Spathes scarious in upper half
Spathes almost entirely scarious at anthesis

1. *I. sisyrinchium* L.
Gynandris sisyrinchium (L.) Parl.

Bulb with fibrous-reticulate tunic. Stem 10-30 cm. high, flexuous. Leaves 1 or 2 cauline, linear, channelled, often curved, longer than the stems. Flowers 2-5, up to 5 cm. in diameter distichous, distant, blue-violet. Perianth with filiform tube subequal to ovary; external segments larger than internal, reflexed, with a yellow or white spot in the middle, and a pubescent line on the claw; the internal erect. Upper lips of stigma deeply divided into 2 subulate-lanceolate lobes. Fl. 3-5.

Arid rocky places especially on the coralline plateaus. *Malta*, *Gozo* and *Comino* very common (S. & C.G.; Borg; Haslam; G. Lanfranco; Wolseley).

Mediterranean region.

1. Iris

5. *Crocus*
6. *Romulea*
2. *Gladiolus*

3. *Lapeyrousia*
4. *Freesia*

1. *sisyrinchium*
2. *xiphium*

3. *foetidissima*
4. *pseudacorus*
5. *germanica*
6. *pallida*

Fjurdulis salvagg
Blue Iris

2. *I. xiphium* L.

Spanish Iris

Bulb with membranous tunic. Stem (25-)30-60(-80) cm. high. Leaves 20-70 x 0.3-0.5 cm., channelled, curved. Flowers solitary, violet-purple. Perianth tube nearly absent; lamina orbicular, narrowed to the oblong claw, streaked or blotched yellow or orange. Filaments free. Capsule trigonal, each face deeply concave. $2n = 34$.

Malta: commonly cultivated and often met with as an escape (Borg).

W. Mediterranean region; cultivated elsewhere.

3. *I. foetidissima* L.

Stinking Iris

Plant 30-90 cm. high, rhizomatous, forming dense tufts, dark green, with an unpleasant smell when bruised. Leaves 30-70 cm. x 10-25 mm., evergreen, at least as long as scape which is angled on one side. Spathes 2-to 3-flowered. Pedicels 4-5 times as long as ovary. Flowers c. 8 cm. in diameter; purplish-livid, rarely livid. Outer perianth-segments obovate-lanceolate, not bearded, inner styles and style branches spatulate. Seeds orange-red. $2n = 40$. Fl. 3-5.

Shady places. *Malta*: very rare (G. Lanfranco) at Wied Inčita, Buskett (S. & C.G.; Borg; Wolseley).

S. & W. Europe; northwards to England and eastwards to N.E. Italy; N. Africa; cultivated for ornament and naturalised elsewhere.

4. *I. pseudacorus* L.

Yellow Iris

Plant 40-150 cm. high. Leaves 50-90 cm. x 10-30 mm., rather glaucous, about as long as the compressed, terete scape. Spathes 2-to 3-flowered. Pedicels about as long as the ovary. Flowers 8-10 cm. diameter, yellow. Outer perianth segments not bearded; variable in shape, inner spatulate, smaller. Style branches yellow. Capsule elliptic, apiculate; seeds brown. $2n = 24, 30, 32, 34, 40$. Fl. 3-6.

Malta: formerly in ditches at Saqqaja (Delicata; Borg); C.G. reports disappearance of this plant by 1911.

Most of Europe; N. Africa; W. Asia.

5. *I. germanica* L.

Plate LV

Fjurdulis ikhal
Garden Iris

Plant 30-100 cm. high, rhizomatous. Leaves 30-70 x 2-3.5 cm., shorter than the branched, cylindrical scape. Spathes scarious in the upper half, 2-to 3-flowered. Pedicels very short. Flowers c. 10 cm. diameter, purple, scented. Outer perianth segments with yellow beard; inner about equalling outer, incurved; tube longer than ovary. Style branches spatulate. Capsule ovoid. $2n = 36, 44, 48$.

Var. *florentina* (L.) Dykes with white flowers is cultivated for ornament and occasionally naturalised.

Rocky places; frequently cultivated. *Malta*: Wied il-Ghasel, Ghajn il-Kbira (S. & C.G.; Borg); Wied Babu, Wied il-Hesri, Mtableh (Borg); Nigret, Dingli (Wolseley); Misrah Ghonoq (Borg; Wolseley).

Perhaps native in the E. Mediterranean region, but widely cultivated and naturalised elsewhere.

6. *I. pallida* Lam.
I. sicula Tod.
I. florentina var. *pallida* Lam.

Iris abjad
 Pale Iris

Stem 15-120 cm. high, exceeding the leaves, usually branched in the upper half. Leaves 20-60 x 1-4 cm., ensiform, acute, glaucous, nearly all radical. Bracts or spathes more or less scarious at anthesis. Perigynium with tube subequal to ovary. Flowers 2-6, pale-violet, rather scented, veins brighter. Outer laciniae bearded on the claw, internal glabrous. Fl. 4-6.

Plants with less scarious bracts and slightly dark flowers referable to *I. sicula* Tod. may be *I. germanica* x *pallida* hybrids.

Rocky places. *Malta*: rare, at Maqluba (S. & C.G.; Borg; Wolseley); Misrah Ghoneq (Borg); Wied il-Hesri (Borg). *Gozo*: Xlendi valley (S. & C.G.; Borg); Munxar (Borg).

N. Italy, W. Jugoslavia; cultivated and naturalised elsewhere.

(Iris tectorum Maxim. (*I. fimbriata* Klatt; *I. chinensis* Bunge), Chinese Iris, is said by Borg to be frequently cultivated in gardens and occasionally escaping).

2. *Gladiolus* L.

Corm covered by a fibrous tunic. Stems leafy. Leaves flat, long and narrow, widest at middle, tapering at tip, distichous. Inflorescence long, spike-like, secund. Spathes usually herbaceous. Flowers more or less zygomorphic, showy, solitary in the spathes. Perianth segments in 2 similar series; tube short, curved. Stamens bent towards upper side of perianth; style branches undivided.

1. Anthers shorter than their filaments
 Anthers as long as or longer than their filaments

1. *dubius*

2. Perianth barely zygomorphic, segments lanceolate, seeds winged
 Perianth strongly zygomorphic, uppermost segments narrowly spatulate; seeds not winged

2. *byzantinus*

3. *italicus*

1. *G. dubius* Guss.

Habb il-Qamh
 Small *Gladiolus*

Corm producing numerous, reddish corms; stem 30-60 cm. high. Leaves up to 30 x 1 cm. Inflorescence usually 5- to 8-flowered. Flowers 4-5 cm. long, rosy-purple, rather bright, segments more or less divaricate, the 3 upper equal, the 3 lower subequal. Anthers subequaling or shorter than filaments. Capsule more or less oblong-obovate. Seeds narrowly winged. Fl. 3-5.

Fields and waste places. *Malta*: rare (G. Lanfranco), Mdina, Fagqanija (S. & C.G.; Borg); Wied il-Ballut, Wied Ghomor (G.D.; Borg); Ghajn Rihana, Wardija, Dingli (Borg). *Gozo*: Xlendi (S. & C.G.; Borg); Mgarr ix-Xini (Borg).

Mediterranean region.

2. *G. byzantinus* Miller

Habb il-Qamh
 Mediterranean *Gladiolus*

Corm c. 1.5 cm. diameter, producing numerous offsets; stems 40-90 cm. high, erect. Leaves up to c. 30 x 1 cm. Scapes simple, exceeding the leaves. Inflorescence 3- to 8-flowered. Flowers 3 cm. or more long, crimson-purple; tube short, curved; 3

upper segments nearly equal. Anthers as long as or longer than filaments. Style branch linear at base, then abruptly dilated and ovoid, not papillose on the margin throughout their length. Capsule obovoid with 3 acute angles; seeds compressed, narrowly winged. Fl. 4-5.

Fields. *Malta*: rare (G. Lanfranco), as at Fagqanija, Mad Dingli (S. & C.G.; Borg); Rabat, Bahrija (Borg). *Gozo*: Xlendi (S. & C.G.; Borg); Mgarr ix-Xini (Borg).

Mediterranean region.

3. *G. italicus* Miller
G. segetum Ker-Gawler

Habb il-Qamh
 Common *Gladiolus*

Like *G. byzantinus*, but upper perianth segments somewhat longer than, and nearly twice as broad as, the laterals; seeds pyriform, not winged 2% = 139. Fl. 3-5.

Cultivated places. *Malta* and *Gozo*: very common (S. & C.G.; Borg; G. Lanfranco; Haslam; Wolseley). *Comino*: frequent (S. & C.G.; Borg; Wolseley).

Mediterranean region.

(*Chasmanthe aethiopica* (L.) N.E. Br. (*Antholyza aethiopica* L.), African Corn-flag, is said by Borg to be cultivated for ornament and occasionally naturalised in gardens.)

3. *Lapeyrouisia* Baker

Corm tunicated. Foliage leaves linear ensiform, distichous, flat. Stems slender, terete. Inflorescence spike-like, many-flowered; spathe valves herbaceous. Perianth weakly zygomorphic, with a long cylindrical tube; segments spreading. Stamens inserted at the throat of the tube. Style filiform with bifid branches. Ovary 3-celled.

1. *L. cruenta* (Lindley) Baker
Anometheca cruenta Lindley

African *Lapeyrouisia*

Corm ovoid; tunic fibrous, brown, finely reticulate. Leaves c. 6, 15-30 x 0.5-1 cm., thin, erect. Stems 30-60 cm. high, simple or branched. Flowers 6-12, arranged in a lax, secund spike. Perianth bright red; segments c. 1 cm. long, oblong, the three lower with a dark spot at their base. Stamens less than $\frac{1}{2}$ as long as the perianth segments. Capsule small, globose. Fl. 4-5.

Malta: naturalised in gardens as at San Anton, Argotti, Lija, Balzan, Attard (Borg).

Native of S. Africa; cultivated elsewhere.

4. *Freesia* Klatt

Corm tunicated. Foliage leaves linear, ensiform, distichous, flat. Stems slender, terete, flexuous. Inflorescence spike-like, many-flowered; spathe valves scarious. Perianth weakly zygomorphic, with a broad tube; segments erect or slightly spreading. Stamens inserted below the throat of the tube. Style filiform with bifid branches. Ovary 3-celled.

1. *F. refracta* Klatt

Plate LIV

Fritja
 Common *Freesia*

Corm ovoid, with a thick, reticulate, fibrous tunic. Stem c. 30 cm. high, with a few much reduced leaves. Basal leaves c. 6, c. 15 x 1.2 cm., firm in texture,

erect. Flowers fragrant, in a lax, secund spike; perianth 2-4 cm. long, bright yellow, bilabiate; tube constricted suddenly below the middle; segments 1-1.5 cm. long, ovate-oblong, central one of the upper lip broader and more obtuse than the side ones. Stamens with anthers just exerted from the perianth tube. Capsule ovoid.

Commonly cultivated; sometimes naturalised. *Malta*: locally abundant at Verdala Park and Buskett (Borg; G. Lanfranco; Haslam; Wolseley).

Native of South Africa; widely cultivated.

5. *Crocus* L.

Corm tunicated. Leaves tufted, linear, channelled, surrounded by scarious sheaths, midrib white beneath. Flowers actinomorphic, shortly peduncled, large and showy, enclosed in bud by 2 spathe, one at the base, one at the top of the peduncle, or without basal spathe; peduncle elongating in fruit. Perianth segments subequal in 2 series; tube long and slender. Ovary subterranean; capsule on a long slender peduncle, 3 celled.

1. *C. longiflorus* Rafin
C. odoratus Biv.

Plate LVI

Zaghfran salvagg
Yellow-throated Crocus

Tunic with reticulate fibres on a membranous base. Leaves 2-30 cm. x 2-4 mm. appearing with or soon after the flowers, glabrous. Spathe 2, the upper green above. Flowers 1-2, sweet-scented; perianth segments violet, often veined outside; throat yellow, sparsely pubescent; anthers yellow; stigmas orange, slightly exceeding the anthers, much divided at the apex. Seeds red. Fl. 10-12.

Uncultivated and rocky ground. *Malta*: rare (G. Lanfranco), as at Dingli, Mtahleb (S. & C.G.; Borg); Buskett (S. & C.G.; Borg; Wolseley); Ta' Lawrence, Faqqanija, Tal-Gholja (Borg).

C. Mediterranean region.

(*C. sativus* L., Saffron Crocus, which differs from *C. longiflorus* in its ciliate leaves, violet-throated perianth, stigmas scarlet, entire or divided into 3 at apex and usually much exceeding the anthers, was cultivated, as at Ghemieri, where according to Borg it sometimes became naturalised.

6. *Romulea* Maratti

Corm tunicated. Leaves tufted, slender, linear, without white midrib. Flowers actinomorphic, solitary in spathe, long-peduncled. Perianth segments in two similar series; tube short. Style branches linear, bifid. Capsule ovoid, three-lobed.

- Flowers 20-30 mm. long; style much exceeding anthers
Flowers 10-20 mm. long; style not or barely exceeding anthers

1. *bulbocodium*
2. *columnae*

1. *R. bulbocodium* (L.) Seb. & Mauri

Violet *Romulea*

Corm solid, small, with a coriaceous tunic. Leaves linear-filiform, somewhat recurved. Scape 1-to 2(-6)-flowered. Flowers 20-25 (-35) mm. long, pale violet with a yellow throat; perianth segments more or less acute, outer with greenish-yellow strises. Filaments hairy below; anthers at times sterile. Fl. 2-3.

Malta: rare (Delicata; Borg).

Mediterranean region.

2. *R. columnae* Seb. & Mauri

Plate LVI

Dark-veined *Romulea*

Corm ovoid, small, producing offsets freely. Leaves 5-10 cm. long, almost setaceous, wiry. Scape shorter than leaves. Spathe of 2 subequal bracts; flowers 1-3, 10-20 mm. long; perianth segments greenish outside, white to purple inside, yellow towards the base, veins purple. $2n = 60$. Fl. 2-3.

Very variable. The following key is to those varieties recorded in *Malta*.

1. Spathe with both valves totally herbaceous, or only the upper with narrow scarious margins
Spathe with upper valve totally scarious or with a very wide scarious margin 2.
 2. Perianth pale violet or lilac, segments 15-20 x 3-5 mm.
Perianth dark violet or lilac, segments 15-22 x 3-5 mm. 3.
 3. Upper valve of spathe not wholly scarious; leaves erect or slightly recurved-appressed.
Upper valve of spathe wholly scarious; leaves very long, appressed to ground
- var. *ramiflora* Ten.
var. *melitensis* Béguinot
var. *columnae*
var. *rollii* Parl.

Arid rocky places. *Malta*, *Gozo* and *Comino*: very common (S. & C.G.; Borg; Haslam; G. Lanfranco; Wolseley).

Mediterranean region; W. Europe.

(*Musa paradisiaca* L. Banana, first introduced in 1913, is widely cultivated round farmsteads and houses).

JUNCALS

CIV. JUNCACEAE

Herbs, usually perennial, glabrous or nearly so. Leaves long and narrow, terete, channelled or grass-like, with sheathing base, sometimes reduced to scales. Flowers few to many, usually in numerous, crowded, monochasial cymes, sometimes heads, rarely solitary. Perianth segments 6, in 2 whorls, greenish or brownish. Stamens in 2 whorls of 3, or inner whorl missing; free. Ovary 1-3 locular; stigmas 3, brush-like; seeds 3-many. Wind pollinated.

1. *Juncus* L.

Glabrous perennials up to 1.5 m. high, more or less rhizomatous. Stem leaves with usually split sheathing base which is often extended above into auricles; lamina channelled, sometimes absent. Inflorescence a cluster of terminal or apparently lateral cymes, sometimes condensed into a head; flowers rarely few or solitary. Capsule many-seeded.

1. Flowering stems without leaves, bearing only sheaths below the apparently lateral inflorescence 2.
- Flowering stems with leaves, inflorescence obviously terminal 5.
2. Leaves with rigid points 3.
- Leaves without rigid points 4.

3. Flowers straw coloured; capsule not or barely exceeding perianth
Flowers reddish-brown; capsule much exceeding perianth

4. Stem when fresh scarcely ribbed; capsule not mucronate
Stem when fresh strongly ribbed below inflorescence; capsule shortly mucronate

5. Plant perennial; leaves septate
Plant annual; leaves not septate

6. Inflorescence a much-branched, leafy panicle; seeds usually ovoid
Inflorescence of one or two terminal heads; seeds narrow

1. *J. bufonius* L.

4. *maritimus*

5. *acutus*

2. *effusus*

3. *subuliflorus*

7. *articulatus*

6. *capitatus*

1. *bufonius*

Simar zghir
Toad Rush

Annual, very variable. Stem 3-15 cm. high, filiform, usually with 1 cauline and several basal leaves. Leaves 1-5 cm. long, setaceous. Inflorescence a much-branched leafy panicle. Flowers mostly sessile and solitary. Perianth segments 2.5-6.0 mm. long, usually lanceolate-acuminate, pale green with a hyaline border, usually longer than the oblong, blunt capsule; seeds often roundly ovoid, $1\frac{1}{2}$ times as long as broad. $2n = c. 60, c. 120$. Fl. 3-5.

Winter-wet rocky hollows. *Malta*, *Gozo* and *Comino*: common (S. & C.G.; Borg; Haslam; G. Lanfranco; Wolseley).

Cosmopolitan, but chiefly in the north and south temperate zones.

2. *J. effusus* L.

Simar
Soft Rush

Densely tufted perennial; stems 30-150 cm. high, bright to yellowish-green, smooth throughout their length when fresh, with 40-90 striae; pith continuous. Leaf sheaths brown, not glossy. Inflorescence about $1/5$ the distance from the top of the stem, many-flowered, lax or condensed into a single rounded head, with ascending, spreading and deflexed branches. Perianth segments 2-2.5 mm. long, lanceolate. Capsule broadly ovoid, retuse, not mucronate. $2n = 40$. Fl. 4-5.

Malta: moist places at Marsa (Delicata; Borg).

North temperate zone; E. and S. Africa, Malaysia, Australia, New Zealand etc.

3. *J. subuliflorus* Drejer
J. conglomeratus auct., non L.

Simar
Compact Rush

Very like 2 (especially like its var. *compactus*) but usually less robust; stems bright greyish green, not glossy, with numerous ridges which are especially prominent just below the inflorescence; bracts widely expanded at base; inflorescence condensed into a rounded head, more rarely of several stalked heads; capsule shortly mucronate. $2n = 40$. Fl. 4-6.

Malta: moist places at Marsa (Delicata; Borg).

Europe east to Asia Minor and the Volga, north to Faeroes and $68^{\circ} 55'$ N. in Norway; N. Africa; Macaronesia; Newfoundland.

4. *J. maritimus* Lam.

Simar tal-baħar
Sea Rush

Densely tufted, very tough perennial. Stems 30-100 cm. high, pale green. Leafy only near the base; pith continuous. Lowest stem leaves with brown sheaths, upper with terete green lamina; all sharply pointed. Inflorescence an interrupted, irregularly compound panicle, shorter than the sharply pointed bracts. Perianth segments 3.0-4.5 mm. long, straw-coloured, lanceolate. Capsule ovoid-trigonus, mucronate, about equalling the perianth. Seeds with a large appendage. $2n = 40$. Fl. 5-6.

Saltmarshes. *Malta*: local (G. Lanfranco), as at Marsaxlokk (S. & C.G.; Borg); Marsa (G.D.; Borg); Salini (Haslam; Wolseley); Marsaskala (Gauci). *Gozo*: Ramla. (S. & C.G.); Borg; Wolseley. *Comino*: (Gulia; Borg).

Atlantic and Mediterranean coasts of Europe, extending into the Baltic and Black Sea, and east to Sind; N. and S. Africa; N. and S. America; Australia; inland in salt areas of S. Europe and C. Asia.

5. *J. acutus* L.

Plate LIV

Simar lix
Sharp Rush

Robust perennial in dense, prickly tussocks. Stem 25-150 cm. high, with a few very sharply pointed foliage leaves. Inflorescence compact, more or less globose, much shorter than the bract. Perianth segments 2.5-4 mm. long, reddish-brown, ovate-lanceolate, becoming almost woody. Capsule broadly ovoid, at least twice as long as the perianth. Seeds with a large appendage. Fl. 3-5.

Saltmarshes. *Malta*: locally common (G. Lanfranco; Haslam); St. Paul's Bay, Mtab-leb, Fiddien, Salini, Gnejna (S. & C.G.; Borg); Bugibba, Ghajn Tuffieha, Marfa (Borg); Ghadira (Haslam; Wolseley); Mistra (Wolseley). *Gozo*: Mgarr ix-Xini (S. & C.G.; Borg; Wolseley); Dwejra (S. & C.G.; Borg); Qala, Nadur, Wied iz-Zejt, Qbajjar (Borg); Ramla, Xlendi, San Blas (Borg; Wolseley); Porgla (Wolseley). *Comino*: St. Mary (Borg; Wolseley).

Mediterranean region; extending up the Atlantic coast to N. France, east to Transcaucasia; Macaronesia; California; S. America; S. Africa.

6. *J. capitatus* Weigel.

Dwarf Rush

Tufted annual. Stems 1-5 cm. high, setaceous, stiffly erect. Leaves 0.5-4 cm. long, all radical, setaceous from a short sheathing base, without auricles. Inflorescence of 3-8 sessile flowers in a single terminal head, rarely with 1-2 lateral heads. Bracts 1-2, the longer much exceeding the inflorescence. Outer perianth segments 3-5 mm. long, curved, ovate-lanceolate, with fine more or less recurved points. Capsule broadly ovoid, truncate, shorter than the perianth. Seeds narrowly obovoid. Fl. 3-4.

Damp places. *Malta*: rare, Ghajn Mula (G.D.; S. & C.G.; Borg); Buskett (Borg).

S. and W. Europe and sparingly through C. Europe to S. Sweden, Finland, and N.W. Russia; Africa; Newfoundland (? introduced); S. America and Australia.

S. America and Australia.

7. *J. articulatus* L.
J. lampocarpus Ehrh. ex Hoffm.

Simar
Jointed Rush

Variable perennial with a slender rhizome. Stem up to 80 cm. high, terete, with 27 laterally compressed, usually curved, dark green leaves with 13-25 in-

conspicuous, transverse septa. Inflorescence repeatedly compound, branches diverging at an acute angle. Flowers c. 3 mm. long, dark chestnut brown to almost black. Perianth segments acute, the inner with broad colourless margins. Stamens 6. Capsule long-ovoid, contracted above to a point. Fl. 3-5.

Along streams and ditches. *Malta*: occasional (Haslam); Wied Gerżuma (S. & C.G.; Borg); Fiddien, Gnejna, Mtaħleb (S. & C.G.; Borg; Wolseley); Ghajn Rihana, Lija, Birzebbuga, Wied il-Għasfura (Borg); Mistra (Wolseley). *Gozo*: Ramla (Borg; Wolseley).

S. Europe; Asia except the Arctic; eastern N. America; N. Africa; introduced into S. Africa, Australia and New Zealand.

MICROSPERMAE

CV. ORCHIDACEAE

Perennial herbs with tuberous roots; almost all mycorrhizic. Leaves entire, often with sheathing base. Inflorescence a spike, raceme, or racemose panicle. Flowers zygomorphic epigynous, usually hermaphrodite. Perianth of 2 whorls of 3 segments, usually petaloid or the outer sepaloid. Median segment of inner whorl (*labellum*) commonly larger and different in shape than remainder, usually on lower side and directed downwards owing to inversion or twisting, often spurred at base. Stamens 1-2, with more or less sessile anthers borne on a special structure, the column; pollen usually cohering, forming 1-4 pollinia in each cell of anther; stigmas 3, one sometimes sterile forming a beak-like rostellum between anther and fertile stigmas (or rostellum forming 1-2 viscid bodies to which pollinia are attached, or represented only by viscidia or absent); no style; ovary inferior, usually 1-locular with many ovules on 3 parietal placentas. Fruit a capsule opening by 3 or 6 longitudinal slits; seeds very numerous and minute, with an undifferentiated embryo. Pollination usually entomophilous and complex, some automatically self-pollinated or apomictic though with the same structural features as the cross-pollinated types.

1. Flowers not spurred
Flowers spurred
2. Flowers less than 5 mm. long, pure white
Flowers more than 5 mm. long, lip usually brownish
3. Upper perianth segments forming a hood; ovary not twisted
All perianth segments spreading; ovary twisted
4. Spur c. 2 mm. long; perianth segments connivent into a hood
Spur about 5 mm. long; perianth segments not connivent into a hood
5. Labellum with central lobe usually longer than lateral
Labellum with 3 subequal lobes

1. *Spiranthes* Rich.

Small, with erect stock, leafy stems and small flowers in spirally twisted, spike-like racemes. Perianth segments similar, the back outer segment cohering with the 2 inner forming half of 2-lipped tube. Labellum, furrowed below and embracing the base of the column, forming lower half of tube; spur 0; nectar secreted by

2 bosses at base of labellum. Column horizontal. Rostellum narrow. Pollinia 2, attached to the viscidium near their summits; caudicles 0.

1. *S. spiralis* (L.) Chevall.
S. autumnalis Rich.

Hajja u Mejta
Autumn Lady's-tresses

Roots 2-3(-5), 1.5-(-4) cm. long, ovoid or ovoid-oblong, radish-shaped, pale brown, hairy. Stem 7-20 cm. high, erect, glandular-hairy especially above, with several, pale green, lanceolate-acuminate, appressed, bract-like scales, and sometimes with the withered remains of last season's rosette leaves still visible at its base. Leaves (4-5) of current season appearing after the flowers in a lateral basal rosette which will flower next season; each c. 2.5 cm. long, ovate, acute, bluish-green, glabrous. Spike 3-12 cm. long, of 7-20, small (4-5 mm. long), white, day-scented flowers in a single more or less spirally twisted row. Bracts lanceolate-cuspidate, concave and hooded, sheathing the ovary and about equalling it. Outer perianth segments oblong-lanceolate, obtuse, translucent, white, more or less ciliate, slightly glandular outside. Inner perianth segments narrowly oblong, obtuse. Labellum broadened, rounded and recurved distally, pale green with a broad white irregularly crenate or fringed margin. Stigma ciliate below. Ovary short, bent outwards at its apex, green, usually not twisted. Capsule about 6 mm. long, obovoid. 2n = 30. Fl. 9-11.

Arid rocky places. *Malta*: rare, W. Malta (G. Lanfranco), as at Wied Inċita, Hawli, Salini, Buskett (S. & C.G.; Borg); Wied Babu (GD); Mellieħa (Gulia); Bugibba, Pwales (Borg); near Għar il-Kbir (Gauci). *Gozo*: Wied il-Lunzjata (Gulia; Borg).

Europe northwards to Denmark and C. Russia; N. Africa; Asia Minor.

2. *Neotinea* Reichenb. fil.

Root tubers entire. Basal leaves appressed to ground, stem leaves sheathing. Spike short, dense, secund. Perianth segments all connivent; labellum directed forwards. Column very short and small, Stigmas 2, large. Rostellum a broad flat plate between the stigma lobes, its apex curving over the two otherwise naked viscidia.

1. *N. maculata* (Desf.) Stearn
Orchis intacta Link
N. intracta (Link) Reichenb. fil.

Dense-flowered Orchid

Stem 15-30 cm. high. Leaves oblong, often dark-spotted. Spike cylindrical, 2-3 cm. long. Bracts whitish, shorter than ovary. Flowers rather small; external perianth-segments ovate, acute, free only at apex, reddish, with violet lines, laterals nearly saccate at base. Labellum reddish, small, trifid, lobes linear, truncate, spreading. Spur very short. Fl. 3-4.

Gozo: Ta' Ċene (Gulia; Borg).

Mediterranean region; Atlantic Europe; Atlantic Islands.

3. *Serapias* L.

Perianth segments hooded, the two inner small, ovate at the base and prolonged into a point, adherent to the base of the lanceolate outer perianth segments; labellum not spurred, trilobed, lateral lobes erect, median reflexed. Connective prolonged at apex into a petaloid tip. Ovary not twisted.

1. Spike short, more or less dense; median lobe of labellum ovate, cordate at base
Spike long, very lax; median lobe of labellum not cordate at base

2. *cordigera*

2. Bracts purplish or reddish, much exceeding the flowers; median lobe of labellum at least 2.3 times as long as wide
Bracts greenish or reddish, not or scarcely exceeding the flowers; median lobe of labellum less than 2.3 times as long as wide

3. Labellum with 2 parallel callosities at its base; median lobe 8-10 mm. long
Labellum with one dark callosity at its base; median lobe 12-15 mm. long

1. *S. vomeracea* (Burm. fil.) Briq.

Long-lipped Serapias

Tubers 2, frequently both sessile. Stem 30-40 cm. high. Spike lax. Bracts purplish or reddish, longer than flowers. Outer perianth segments coloured like the bracts, connivent to apex. Labellum 30-40 mm. long, dark purple, pale in at least the centre of the median lobe; median lobe 15-25 x 6-10 mm., deflexed, lateral lobes erect, with 2 slightly divergent callosities at the base. Fl. 3-4.

Arid rocky places. *Malta*: rare (G. Lanfranco), as at Ghajn Mula (Borg; S. & C.G.; Borg); Buskett, Wied Ghar Dalam (Gulia; Borg); Wied Hzejjen (Borg). *Gozo*: Pergla, Ta' Harra (Gulia; S. & C.G.; Borg).

Mediterranean region.

2. *S. cordigera* L.

Heart-flowered Serapias

Tubers 2, one sessile, the other often shortly stalked. Stem 15-35 cm. high, frequently spotted at base. Spike short; more or less dense. Bracts reddish, equal to or longer than flowers. Outer perianth segments coloured like the bracts, connivent to apex. Labellum dark purple or reddish; median lobe 15-25 x 10-25 mm., villous, sinuate at margin, ovate, acuminate, cordate at base; lateral lobes erect, with 2 narrow, divergent white or dark pink callosities at base. Fl. 3-5.

Arid places. *Malta*: rare (G. Lanfranco), as at Wied Indita (GD.); Wied Qirda (Gulia). *Gozo*: Wied il-Lunzjata (Gulia).

Mediterranean region.

3. *S. parviflora* Parl.

S. lingua var. *parviflora* (Parl.) Fiori

Bajdet il-Fenek

Small-flowered Serapias

Tubers 2, one sessile, the other shortly stalked. Stem 10-25 cm. high. Spike lax. Bracts subequal to flowers, pale violet, edged with green. Outer perianth segments coloured like the bracts, free in upper third, ovate-lanceolate, acuminate. Labellum as long as outer perianth segments; median lobe 8-10 x 3-5 mm., ovate, acute, glabrous or pubescent, dark purple, with a pale red band at base. Fl. 3-4.

Arid, rocky and waste places. *Malta*, *Gozo* and *Comino*: locally frequent (S. & C.G.; Borg; G. Lanfranco; Wolsley).

W. Europe; Mediterranean region.

4. *S. lingua* L.

Bajdet il-Fenek

Tongue Serapias

Tubers 2, one sessile, other long-stalked. Stem 15-35 cm. high. Spike lax. Bracts shorter or longer than flowers, pale violet, green on outer parts. Outer perianth segments same colour as bracts, free at apex only. Labellum and lateral

lobes open at the end; median lobe 13-20 x 8-10 mm., not reflexed, ovate, acute, glabrous or pubescent, dark purple. Fl. 3-5.

Arid rocky places. *Malta*: very rare (G. Lanfranco), as at Wied il-Ghasel, Wied Ghenoq (S. & C.G.; Borg; Wolsley); Wied Indita, Wied il-Baruni (GD.; S. & C.G.; Borg).

Mediterranean region.

4. *Ophrys* L.

Root tubers entire. Basal leaves in a rosette. Stem with one or two leaves sheathing at the base. Spike lax, few (1-10) flowered. Perianth-segments spreading, inner laterals usually smaller than outer. Labellum large, entire or 3-lobed, often convex, velvety, usually dark-coloured and conspicuously marked; spur 0; nectaries 0 (but projections present). Column long, erect; stigma large, depressed; rostellum represented by 2 separated pouches. Pollinia 2; attached basally to separate, more or less globose viscidia in the pouches. Ovary not twisted.

1. Connective obtuse
Connective acute or acuminate

2. Inner perianth-segments green, yellow green or brown
Inner perianth segments red, pink or white

3. Labellum deeply 3-lobed; lateral lobes gibbous, bent back so that the labellum appears inflated, appendix reflexed
Labellum shortly lobed or slightly 3-lobed; lateral lobes not gibbous, not bent back, labellum not sub-globose, appendix none

4. Labellum very hairy at the margins; speculum large and shining, blue, yellow edged, often 3-lobed, inner perianth segments densely hairy
Labellum not hairy on the margin, papillose above; speculum less shining

5. Labellum flat at the margins; with a broad yellow zone, rest dark brownish or purplish
Labellum more or less reflexed at the margin, without or with narrow yellow zone

6. Flowers larger; inner perianth segments green; labellum 12-22 mm. long; not deflexed at the base, central lobe commonly emarginate
Flowers small; inner perianth segments whitish or pale green; labellum 7-9 mm. long, curved backwards, central lobe kidney shaped or oval

7. Labellum narrowly 3-lobed, without appendix; perianth segments white, inner glabrous
Labellum subentire, appendix curved forwards; perianth segments commonly pink, inner pubescent

8. Outer perianth segments green, yellow or brown
Outer perianth segments pink, purple, whitish or 2-coloured

12. *bombiflora*

1. *speculum*

2. *lutea*

3. *fusca*

4. *pallida*

4. *pallida*

10. *lethrediniifera*

9. Appendix of labellum small or absent; inner perianth segments half as long as outer, often wavy
Appendix of labellum larger; inner perianth segments $\frac{1}{2}$ as long as outer
10. Labellum entire
Labellum clearly 3-lobed
11. Inner perianth segments glabrous; speculum small, blue near apex of labellum
Inner perianth segments pubescent; speculum large, whitish in basal half of labellum
12. Appendix of labellum recurved; appendix of connective elongated
Appendix of labellum curved forward, appendix of connective short
13. Inner perianth segments nearly equalling outer
Inner perianth segments c. $\frac{1}{2}$ as long as outer
14. Inner perianth glabrous; speculum not reaching edge of lip
Inner perianth segments pubescent; speculum reaching edge of lip

1. *O. speculum* Link

Fig. 26

Dubbiena kahla
Mirror Orchid

Outer perianth segments 6-8 mm. long, oblong-ovate, green, often brown-striped, glabrous, the upper hooded, the laterals spreading; inner perianth segments ovate or lanceolate, brownish, $\frac{1}{2}$ as long as the outer, densely papillose. Labellum up to 13 x 15 mm. long, deeply three-lobed, very hairy on the margins, purplish-brown; lateral lobes spreading, yellowish; central lobe rotund-triangular from a narrow base or suborbicular, often a little emarginate, rolled back at the margin; speculum large, shining, blue, yellow-bordered, sometimes three-lobed. Connective obtuse. Fl. 3-4.

Arid rocky places. *Malta*: local (G. Lanfranco), as at Wied Babu (Gulia; Borg); St. Julians (Duthie; Borg); Buskett, Verdala, Wied il-Ghasel (Borg; Wolseley); Misraħ Ghonoq, Wardija, Mellieħa (Borg); Għar il-Kbir (Wolseley). *Gozo*: Xlendi, Qala Dwejra, between Wied Bingemma and Wied ir-Riħan (S. & C.G.; Borg; Wolseley); Qala (Duthie; S. & C.G.; Borg); Ta' Cené (Borg; Wolseley). *Comino*: (Borg; Wolseley; Gauci).

Mediterranean region.

2. *O. lutea* (Gouan) Cav.

Fig. 26

Zunžana
Yellow Orchid

Outer perianth segments c. 10 mm. long, subglabrous or papillose on the margin, oblong-ovate, obtuse, green; central curved inwards, laterals spreading; inner perianth segments linear-oblong, green or yellowish, $\frac{1}{2}$ to $\frac{1}{3}$ as long as the outer. Labellum 12-18 mm. long, flat at the margin, suborbicular or oblong, with a broad yellow zone; the rest brown or dark purplish, papillose, slightly to conspicuously three-lobed; lateral lobes ovate, obtuse; central lobe reniform, often notched; speculum central, often 2-lobed, grey or blue-grey. Connective obtuse. Fl. 3-4.

5. *sphagodes*
9. *fuciflora*

6. *bertolonii*
9. *fuciflora*

11. *apifera*

7. *lunulata*

6. *bertolonii*

8. *scolopax*

11.
12.

13.
14.

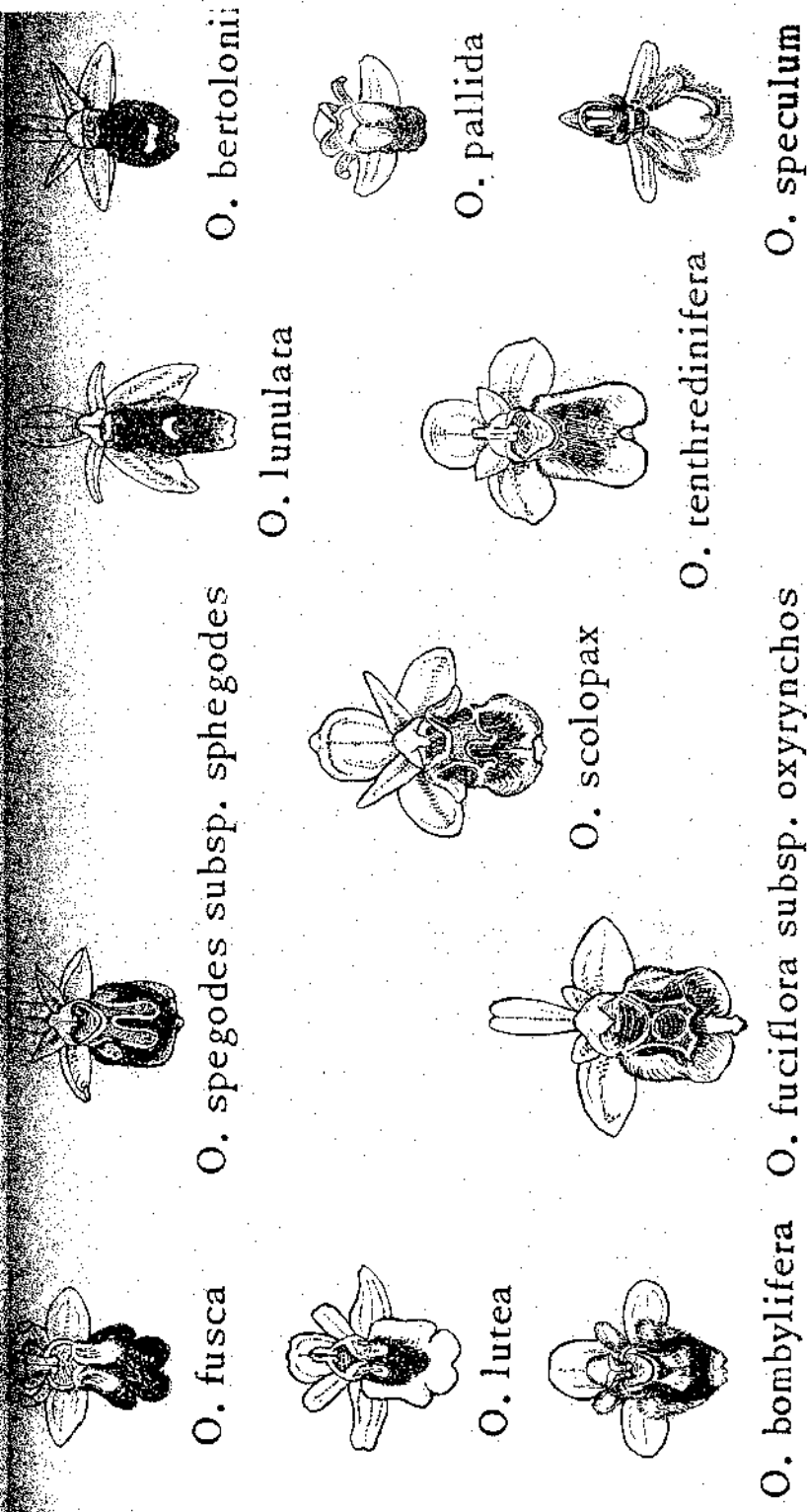


Fig. 26. Flowers of *Ophrys* species

Arid rocky places. *Malta*: local (G. Lanfranco), as at Buskett, Mellieħa, Wied Ghomor, Hawli (S. & C.G.; Borg); Cospicua (S. & C.G.; Duthie; Borg); Salini Pwales (Wright; Borg); Gżira (Medlycott fide Gullia); Verdala, Wardija, Faqqanija (Borg); Għar il-Kbir (Gullia; Wolseley). *Gozo*: Mgarr ix-Xini (Duthie; Borg); Ta' Cent (Borg).

Mediterranean region.

3. *O. fusca* Link

Fig. 26

Dubbiena
Brown Orchid

Outer perianth segments c. 10 mm. long, subglabrous or papillose on the margin, broadly ovate, obtuse, green, the central curved inwards, the laterals spreading; inner perianth segments linear-oblong, green or yellowish, $\frac{1}{2}$ as long as the outer. Labellum 12-18 mm. long, oblong, hairy, purplish-brown, 3-lobed with reflexed margins, the median lobe longest, more or less emarginate; speculum of 2 oblanccolate blue-grey or purple areas, glabrous, shining. Connective obtuse. Fl. 12-5.

Arid rocky places. *Malta*, *Gozo* and *Comino*: locally common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region.

4. *O. pallida* Rafin.

Fig. 26

Pale Green Orchid

Differs from *O. fusca* in having outer perianth segments whitish or pale green, inner perianth segments yellowish-green to orange; labellum 7-9 mm. long, strongly curved backwards. Fl. 3-4.

Arid rocky places. *Malta*: Zonqor (Gullia); San Tumas, Marsaskala (Gullia; Borg); Verdala, Buskett, Wied Incita, Wied il-Għasei (Borg).

W. Mediterranean region.

5. *O. sphegodes* Miller
O. arachnifera Hudson

Fig. 26

Brimba sewda
Early Spider-orchid

Outer perianth segments 10-12 mm. long, oblong-lanceolate, obtuse, green, the centre segment commonly narrow; inner segments 5-7 mm. long, yellowish or brownish-green, often undulate, glabrous, oblong-lanceolate. Labellum entire, rarely 3-lobed, rolled back and hairy at the margins, retund, ovate or obovate, without an appendix; speculum commonly H-shaped, blue-violet or dark purple. Connective acute. $2n = 36$. Fl. 3-4.

Two subspecies occur. Subsp. *sphegodes* has the brown labellum (8-)10-12 x 8-10 mm. Subsp. *atrata* (Lindley) E. Meyer, has the dark violet labellum 8-12(-13) x 8-12(-13) mm.

Malta: local (G. Lanfranco), as at Wied Babu, Buskett, Wied Moqbel, Wied Ghomor, Wied Incita (S. & C.G.; Borg); Pwales (G.D.; Borg); Wied Għasfurja (Gullia; Borg); Wied iż-Żurrieq (Duthie); Għar il-Kbir, San Pawl tat-Targa (Wolseley); Wardija (Gauci). *Gozo*: Wied Bingemma, Wied Qorrot (S. & C.G.; Borg); Ta' Cent (Borg; Wolseley); Pergla (Wolseley).

W. and C. Europe to Mediterranean region.

6. *O. bertolonii* Moretti

Fig. 26

Bertoloni's Orchid

Outer perianth segments 10-12 mm. long, pink or whitish, entire, ovate-oblong, shorter than labellum; inner segments 6-8 mm. long, pink, entire, linear, not cordate at base, narrower than outer, glabrous. Labellum 10-15 mm. long, not gibbous at base, oblong or obovate, entire or 3-lobed, emarginate with margins rolled back, blackish-violet, velvety; appendix curving up; speculum nearly square, glabrous, near apex of labellum. Connective acute. Fl. 3-4.

Arid rocky places. *Malta*: Marsaskala (Gullia; Borg); Salini (Gullia; Borg); Misraħ Ghonoq (S. & C.G.; Borg; Wolseley); Wardija (Gauci).

W. and C. Mediterranean region; Bulgaria.

7. *O. lunulata* Parl.

Fig. 26

Moon Orchid

Outer perianth segments 10-13 mm. long, pinkish-violet, ovate or oblong, obtuse, the lateral deflexed; inner segments 6-9 mm. long, pubescent, linear-lanceolate. Labellum 10-12 mm. long, deeply 3-lobed, reflexed at the margins, papillose, brown, rarely blackish-purple, greenish or yellow on the margins; apex emarginate; appendix small, pointing forwards; speculum crescent-shaped, near the base of the labellum, blue or whitish. Connective acute. Fl. 3-4.

Arid rocky places. *Malta*: Verdala Park, Buskett, Wied Incita (Borg).

Italy, Sicilia, Sardegna.

8. *O. scolopax* Cav.

Fig. 26

Woodcock Orchid

Outer perianth segments 8-10 mm. long, pink or purplish-pink, rarely whitish, oblong-ovate, glabrous; inner segments 2-4 mm. long, lanceolate or triangular, papillose, pinkish. Labellum 8-12 mm. long, 3-lobed, rarely subentire, with well-developed lateral gibbosities, margins reflexed; appendix short, obtuse, pointing forwards; speculum large, variable in shape, basically H-shaped, reaching the edges of the labellum. Connective acute. Fl. 3.

Although not recorded for *Malta* a description of the species is included as it is felt that it ought to be there.

Mediterranean region.

9. *O. fuciflora* (Crantz) Moench
O. arachnites (L.) Reichard

Fig. 26

Late Spider Orchid

Outer perianth-segments 10-12 mm. long, spreading, rose-pink; inner segments triangular, pinkish or with a green central stripe, pubescent. Labellum 10-12 x 11-15 mm., broader than long, slightly convex, 3-lobed; central lobe large, velvety, maroon to dark brown, with bold symmetrical pattern in greenish-yellow lines; appendage flat or ascending. Connective acute. $2n = 36$. Fl. 1-5.

Two subspecies are recorded. Subsp. *fuciflora* has the perianth segments rose or pale purple or white and the labellum gibbous. Subsp. *oxyrhynchos* (Todaro) Soó has the perianth segments green and the labellum not gibbous.

Arid rocky places. *Malta*: rare (G. Lanfranco) as at Wied Babu (G.D.; S. & C.G.; Borg); Wied Incita, Buskett (Borg); Għar il-Kbir (Wolseley).

W. and C. Europe to Mediterranean region.

10. *O. tenthredinifera* Willd.
O. rosea (Desf.) Grande

Fig. 26

Saw-fly Orchid

Outer perianth segments 6-12 mm. long, pink or whitish, ovate-oblong, obtuse, concave; inner segments 2-4 mm. long, broadly triangular, pubescent; labellum 11-14 mm., as wide as long, greenish, yellowish or brown, with a tuft of hairs towards the bilobed apex, margins often yellowish, hairy, sometimes reflexed; appendage glabrous and entire, ascending; speculum small, towards the base of the labellum, variable, generally crescent-shaped. Connective obtuse. Fl. 1-3.

Arid rocky places. *Malta*: Wied Babu (GD.; S. & C.G.; Borg).

Mediterranean region.

11. *O. apifera* Hudson

Fig. 26

Nahla
Bee Orchid

Outer perianth segments 12-15 mm. long, rose pink or whitish, greenish on the back; inner 3-4 mm. long, broadly triangular, pinkish-green, pubescent; labellum 12-15 mm. long, brown, deeply 3-lobed, margins revolute, pubescent; gibbositities large (c. 3 mm. in diameter), hairy; appendage acute, reflexed; speculum crescent-shaped to H-shaped. Connective acuminate, $2n = 50$. Fl. 4-5.

Sheltered valleys. *Malta*: rare (G. Lanfranco), as at Mtahleb, Fiddien, Wied Rumi (S. & C.G.; Borg); Cottonera, Ghasfurja, Gerżuma (Gulia; Borg); Buskett (Borg).

W. and C. Europe to Mediterranean region.

12. *O. bombyliflora* Link.

Fig. 26

Nahla
Bumble-bee Orchid

Outer perianth-segments 9-12 mm. long, pale green, ovate, obtuse; inner 3 mm. long, oblong, green at apex, purple at base, pubescent; labellum 8-10 mm. long, bilobed, margins hairy, reflexed, brownish and glabrous in the centre; gibbositities well developed, very hairy; appendix absent; speculum in centre; lip bluish, bilobed. Connective obtuse. Fl. 3-4.

Rocky places. *Malta*: locally frequent (Borg; G. Lanfranco; Wolseley); Manodland, Wied Ghomor, Wied Babu, Gnejna, Wied Gerżuma, Kordin (S. & C.G.); Wied Inčita (S. & C.G.; Borg; Wolseley); Buskett (Borg; Wolseley); Ghar il-Kel (Wolseley); Mellieha (Duthie); Mistra, Ghajn Tuffieha (Borg). *Gozo*: Xlendi, Dwejra, Mgarr ix-Xini (S. & C.G.); Ta' Cenc (Borg; Wolseley); Pergla (Wolseley).

Mediterranean region.

5. *Orchis* L.

Root-tubers rounded, unforked. Leaves sheathing, the basal in a rosette. Flowers usually many in a spike. Bracts membranous. All perianth-segments except the labellum connivent into a helmet over the column, or only the outer lateral segments spreading or turning upwards. Labellum usually 3-lobed, directed downwards, with spur. Column erect; stigma more or less 2-lobed, roofing entrance to spur; rostellum overhanging the stigma as a single pouch enclosing 2 separate more or less globular viscidia. Pollinia 2, each narrowed below to a caudicle and attached by a basal disk to one of the viscidia. Capsule erect.

1. At least the outer perianth segments spreading
All perianth segments (except labellum, connivent to form a helmet

1. *saccata*

2. Lateral lobes of labellum strongly reflexed
Labellum flat

3.
4.

- Spur cylindrical, 12-13 mm. long
Spur spatulate-clavate at apex, 6-8 mm. long

2. *morio*
3. *longicornu*

- Lobes of labellum linear, the median deeply 3-lobed
All lobes of labellum ovate or spatulate

6. *italica*

5.

- Median lobe of labellum entire, acute to spatulate
Median lobe of labellum with 2 lateral lobes and a small central lobe

4. *coriophora*

5. *tridentata*

- O. saccata* Ten.
O. collina Soland.

Red Orchid

Stems 10-20 cm. high. Leaves ovate-elongate, acute, frequently black-spotted. Spike 3 to 15-flowered, elongate, lax, rose-violet. Bracts large, with simple or rarely branched nerves, just longer than ovary. Outer perianth segments erect, or at least the 2 laterals reflexed, oblong, obtuse, purple or rose, rarely white. Labellum entire, veined, margin crenulate, obovate, and nearly orbicular. Spur large, sack-shaped, 2-3 times shorter than ovary. Fl. 1-3.

Rocky places. *Malta*: locally frequent (G. Lanfranco; Wolseley), as at Bingemma, Buskett, Kordin, Hawli, Mgieret, Wied Inčita, Lūqa (S. & C.G.; Borg); Floriana, Fortifications, Wied iż-Zurrieq, Hal Far, Wied Gerżuma, Dingli, Verdala, Faqqanija (Borg). *Gozo*: Mgarr ix-Xini, Ta' Cenc, Mgarr, Qala (Borg).

Mediterranean region.

2. *O. morio* L.

Green-winged Orchid

Stem 10-40 cm. high. Leaves elliptic-oblong to lanceolate, unspotted. Spike 2-8 cm. long, rather lax. Bracts coloured. Outer perianth-segments ovate, purple, with conspicuous green veins, rarely flesh-coloured or white; inner segments narrower, paler. Labellum 3-lobed, lateral lobes reddish purple, more or less folded back, central lobe paler, dotted with deep red purple, about equalling the lateral lobes. Spur 6-8 mm. long, cylindric, equalling the ovary, almost straight, ascending. $2n = 36$. Fl. 2-4.

Arid rocky places. *Malta*: Wardija, Bingemma, Tal-Gholja (Gulia; S. & C.G.; Borg). *Gozo*: Mgarr (Gulia; Borg).

Europe south from Gotland and S. Sweden; Caucasus; Asia Minor; Siberia.

3. *O. longicornu* Poiret

Horned Orchid

Stem 20-30 cm. high. Leaves oblong-lanceolate. Spike nearly cylindrical, lax. Bracts purple, 6-8 mm. long, shorter than ovary. Flowers violet-purple, rarely white. Labellum c. 8 mm. long, white or pale pink, spotted in the centre; lateral lobes dark violet, deflexed, median lobe short; spur 12-13 mm. long, subequal to ovary, curved, spatulate-clavate at apex, ascending. Fl. 2-4.

Arid places. *Malta*: very rare at Wied Babu (Delicata; Borg); Wied Moqbel, Marsakala (Gulia; Borg); Zurrieq (Duthie; Borg). *Gozo*: Pergla (Gulia; Borg).

W. Mediterranean region.

4. *O. coriophora* L.

Bug Orchid

Stem 10-30 cm. high. Leaves oblong. Spike 4-10 cm. long, dense, ovate-cylindrical. Bracts generally longer than ovary. Flowers 6-11 mm. long, dark violet, or rarely white, smelling of insects, or with a pleasant smell. Labellum spotted or blotched, 3-lobed; median lobe entire; spur half length of ovary. Fl. 4-5.

Arid rocky places and fields. *Malta*, *Gozo* and *Comino*: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region.

5. *O. tridentata* Scop.

Toothed Orchid

Stems 10-30 cm. high. Leaves linear-lanceolate. Spike short, dense. Flowers 12-16 mm. long, reddish, rarely white; outer perianth segments acute or acuminate, in robust plants with red stripes. Labellum many-spotted, inclined-pendulous; lateral lobes linear-spathulate, truncate, median lobe obcordate. Fl. 12-3.

Two subspecies occur. Subsp. *tridentata* has the flowers 12-16 mm. long with the median lobe bilobed with a recurved tooth between the lobes, and spur more or less equalling ovary. Subsp. *lactea* (Poirot) Rouy has the flowers 9-11 mm. long, median lobe entire or emarginate but without a tooth, and upper $\frac{1}{2}$ - $\frac{3}{4}$ as long as ovary.

Rocky places. *Malta*: locally frequent (G. Lanfranco), as at Bingemma, Kordin (S. & C.G.); Wied il-Ghasel (S. & C.G.; Wolseley); Wied Babu (G.D.; S. & C.G.; Borg); Wied Znuber, Wied Has-Saptan (Gulia; Borg); Wied In-Ita, Bahrija, Busket (Borg); Ghar il-Kbir (Borg; Wolseley). *Gozo*: Wied il-Lunzjata (Borg).

Mediterranean region to C. Europe.

6. *O. italica* Poirot

O. longicruris Link

Hajja u Mejta tal-Werga Fdewra
Italian Orchid

Stem 20-30 cm. high. Leaves undulate at margins, oblong or lanceolate. Spike ovate, dense, more or less large. Bracts short, c. $\frac{1}{2}$ length of ovary, squamiform. Flowers reddish, occasionally violet (rarely with nearly white labellum); external perianth segments connivent, hooded, more or less massive. Labellum lightly spotted, trilobed, median lobe with two lateral and one small acute acentral lobe, lobes linear, 1 mm. wide; spur half the length of ovary. Fl. 3-5.

Rocky places in valleys. *Malta*: very rare (G. Lanfranco), as at Wied Babu (S. & C.G.; Borg); Wied il-Zurrieq (Duthie; Borg; Gauci); Wied il-Ghasel (Borg). *Gozo*: Gnicn Imrik (S. & C.G.; Borg).

Mediterranean region.

6. *Anacamptis* Rich.

Root-tubers entire. Outer lateral perianth-segments spreading. Labellum deeply 3-lobed, with 2 obliquely erect guide-plates, decurrent on its base from the lateral lobes of the column; spur long, slender, with no free nectar. Column short; stigmas 2, on the rounded lateral lobes of the column (which are continued downwards as guide plates); rostellum a pouch between the stigmas and partially closing the entrance to the spur. Pollinia 2, narrowed downwards into caudicles which are attached by their bases to a single viscidium in the pouch.

1. *A. pyramidalis* (L.) Rich.

Pyramidal Orchid

Stem 20-50(-75) cm. high, with 2-3 brown sheathing scales below. Lower leaves 8-15 cm. long, narrowly oblong-lanceolate, keeled, grading into bracts above; all unspotted. Spike 2-5 cm. long, at first markedly conical, dense-flowered. Bracts slightly exceeding the ovary. Outer lateral perianth-segments spreading; outer, median and inner laterals connivent into a hood, acute; all deep rosy-purple, becoming paler. Labellum c. 6 mm. long, pale rose, with 3, subequal more or less entire lobes; guide-plates convergent towards base of column. Spur c. 12 mm. long, filiform, equalling or exceeding the ovary. $2n = 40$. Fl. 4-6.

Two varieties occur. Var. *pyramidalis* has the bracts longer than ovary and inner perianth segments acute. Var. *sommieriana* Borg has the bracts shorter than the ovary and the inner perianth segments obtuse.

Rocky places and valleys. *Malta*, *Gozo* and *Comino*: frequent (S. & C.G.; Borg; Wolseley). *Cominotto*: (S. & C.G.; Borg).

Europe north to S. Scandinavia and C. Russia; W. Asia; N. Africa.

PRINCIPES

CVI. PALMAE

Trees or shrubs with a woody stock. Leaves palmatisect or pinnatisect. Leaflets induplicate (inserted with the midrib below the leaflet margin) or reduplicate (inserted with the midrib above the leaflet margin). Stipules 0. Flowers unisexual or hermaphrodite, actinomorphic, perianth segments in 2 series, stamens 3-6, carpels 3. Fruit a drupe or nut.

- | | |
|---|-------------------------------|
| 1. Leaves pinnate | 2. |
| Leaves palmate | 4. |
| 2. Plant small and slender, up to 1.2 m. high | <i>Chamaedorea</i> Willd. |
| Plant large and stout, more than 1.5 m. high | 3. |
| 3. Leaflets reduplicate; spadix scarcely branched | <i>Howea</i> Beccari |
| Leaflet induplicate; spadix with numerous branches | 2. <i>Phoenix</i> |
| 4. Plant with very slender cane-like stems in clumps up to 5 m. | <i>Rhapis</i> L. |
| Not as above | 5. |
| 5. Plant small, suckering | 1. <i>Chamaecrops</i> |
| Not as above | 6. |
| 6. Dead leaf bases completely hiding trunk | <i>Washingtonia</i> B. Wendl. |
| Not as above | 7. |
| 7. Leaves stiff; trunk naked, knobbly | <i>Latania</i> Commerson |
| Leaves not stiff; trunk with persistent leaf bases | 8. |
| 8. Dead leaves forming short skirt; leaflets not pendulous | <i>Erythea</i> S. Watson |
| Dead leaves dropping; leaflets strikingly pendulous | <i>Livistonia</i> R. Br. |

1. *Chamaecrops* L.

Sprawling or with a short trunk, suckering. Spadix branched or spike-like, with 2-4 spathes. Plants with dioecious or hermaphrodite flowers, or with male and

hermaphrodite clones. Male flowers with 6 stamens, filaments massive at base. Hermaphrodite flowers with 6 stamens and 3 free carpels. Each carpel with one subsessile stigma. Drupe elliptical, one-seeded. Seeds with horny albumen, ruminate.

1. *C. humilis* L.

Gummar safran
Dwarf Palm

Stock covered with leaf bases, usually 1-3 m. high. Leaves palmate with sharp blades arranged in the form of a fan, divided into 10-15 lanceolate segments. Spathe oval or oblong-spathulate, reddish woolly at margin. Flowers yellowish-green. Mature fruit 1.5-4 cm. long, hollow to reddish, ovoid. Fl. 4-5.

Malta: originally native (Borg); frequent in gardens (Borg; Haslam).

Mediterranean region.

2. *Phoenix* L.

Trees with tall trunks, generally solitary. Leaves induplicate, pinnate, lower leaflets reduced to spines. Flowers dioecious, sessile on branches of spadix. Spadix 30-40 cm. long, flexuous-pendulous, surrounded by a large spathe. Male flowers with sepals cupule-like, 3-dentate; petals 3-partite; stamens 3-6, subsessile. Female flowers nearly equal to male with 3 distinct ovaries, stigmas sessile, hooked. Drupe elliptical-oblong, 1-seeded. Seeds albuminous, hard. The species are inter-fertile and many garden hybrids exist.

1. *P. dactylifera* L.

Palma
Date Palm

Trunk slender, erect, 10-30 m. high, suckering freely, with terminal tuft of about 20 leaves up to 6 m. long. Fl. 4-5 (Borg).

Malta, Gozo and Comino: cultivated for ornament and producing commercial dates when the inflorescences are covered by polythene bags to aid ripening; sometimes naturalised (Borg); as at Mtaħleb in Dingli Cliff area (Wolseley).

Probably originating from the Middle East and widely planted throughout the Mediterranean region.

(*P. canariensis* Chabaud, Canary Date Palm, with a thick trunk 4-20 m. high and a crown of 200 leaves up to 6 m. long, and *P. roebelenii* O'Brien, Small Date Palm, with a slender trunk up to 2 m. high and leaves 0.5-1 m. long are occasionally planted.)

The following palms are planted in public gardens and along highways (fide Borg).

Chamaedorea elegans Martius

Collinia elegans (Martius) Liebmann; *Neanthe bella* O.F. Cook

Plant dioecious; stem slender, up to 1.5 m. high. Leaves c. 60 cm. long, pinnate; leaflets tapering to a point. Inflorescence stalk branched.

Native of Mexico.

Elegant Palm

Erythea armata (S. Watson) S. Watson.
Brahea glauca Hook. fil.

Californian Palm

Trunk stocky, up to 15 m. high. Leaves palmate, persisting and deflexed when dead, stiff, blue-grey, wavy. Flower stalk up to 6 m. long, projecting beyond the crown.

Native of S. California.

Howea fosterana (C. Moore & F. Mueller) Beccari

Fosters Palm

Trunk up to 15 m. high, with crowded rings. Leaves 1.5 m. long, arched, with numerous, narrow, drooping leaflets. Inflorescence branched, emerging from the leaf bases. Fruit up to 10 cm. long, closely packed on the stem.

Native of Lord Howe Island.

Latania lonfardoides (Gaertner) H.E. Moore

Mascarene Palm

L. borbonica Lam.; *L. commersonii* J.G. Galetin

Trunk tall, slender, knobbed with leaf scars. Leaves very stiff, 2-2.5 m. in diameter, costae palmate, dark grey-green, pale underneath, veins or margins prominently tinged with red. Inflorescence up to 2 m. long, among the leaves.

Native of the Mascarene Islands.

Livistona australis (R. Brown) Martins

Australian Palm

Trunk up to 20 m. high covered by leaf-bases embedded in fibre. Leaves glossy green, palmate, segments drooping at tip. Inflorescence branched, hanging from crown. Fruit small and red.

Native of Australia.

Rhaphis excelsa (Thunb.) Henry

China Palm

R. flabelliformis L'Hér.

Small shrub up to 5 m. high with cane-like stems growing in a clump. Freely suckering. Leaves palmate, glossy; segments up to 10, praemorse. Inflorescence short, much branched, from the leaf-bases. Fruits c. 1 cm. long.

Native of S. China.

Washingtonia robusta H. Wendl.

Washington's Palm

Very scruffy tree up to 25 m. high, with a slender trunk totally obscured by deflexed, dead leaves. Leaves palmate, bright green; leaflets pendulous.

Native of South-western N. America.

SPATHIFLORAE

CVII. ARACEAE

Perennial, usually glabrous herbs, with underground rhizomes or tubers. Leaves all basal, usually with a distinct petiole, and often with more or less reticulate venation. Flowers small, often unisexual, arranged in a compact spike (spadix), subtended and usually partly enfolded by a large, petaloid or leaf-like bract

(*spathe*), the axis of the spadix often prolonged beyond the flower-bearing zone as a fleshy, usually coloured *appendix*. In monoecious plants the female flowers are at or near the base of the spadix, the male flowers above them; vestigial, sterile flowers, usually in the form of filiform papillae, may also be present. Perianth of 4-6, free, sepaloid segments, or (more usually) absent. Stamens 1-6, rarely more. Ovary superior or nude, sometimes sunk in the axis of the spadix, 1- to 3-locular; stigma usually sessile or subsessile. Fruit a berry, sometimes rather dry.

The majority of European species have more or less fetid flowers and are pollinated by flies.

- | | | |
|---|---------------------------------------|---|
| 1. Leaves pedately divided into numerous segments
Leaves entire or with 2 basal lobes | 3. <i>Dracunculus</i> | 2 |
| 2. Base of spathe with margins connate forming a closed tube
Base of spathe overlapping but free | 2. <i>Arisarum</i> | 3 |
| 3. Leaves not peltate
Leaves peltate | 1. <i>Arum</i>
4. <i>Colocasia</i> | |

1. *Arum* L.

Stock a tuber. Leaves entire, net-veined, petioles sheathing at base. Spathe convolute, margins not connate. Spadix terminal, upper part without flowers. Flowers all unisexual, female below, the upper sterile; male above, the upper sterile. Ovary 1-locular; seeds 1-5.

1. *A. italicum* Miller

Garni
Italian Lords-and-Ladies

Plant 20-30 cm. high; tubers c. 5 cm. long. Leaves up to 15-30 cm. long, triangular-hastate, long-petioled, not spotted, midrib pale yellowish-green or white. Spathe up to c. 40 cm. long, pale green, tip deflexed. Spadix about $\frac{1}{2}$ length of spathe, upper part yellow or orange yellow. Berry scarlet. $2n = 83,84$. Fl. 3-4.

Valleys and sheltered road or field margins. *Malta*, *Gozo* and *Comino*: common (S. & C.G.; Borg; Haslam; G. Lanfranco; Wolseley).

S. Europe; N. Africa.

2. *Arisarum* Miller

Stock a tuber or rhizome. Leaves petiolate, entire. Spathe deciduous, the lower part with margins united to form a closed tube, the upper part cuculate, enfolding and partly concealing upper part of spadix. Spadix shorter than or equaling spathe, with long appendix. Flowers unisexual, without perianth, the female 1-6, at extreme base of spadix, with c. 20 male flowers immediately above them; sterile flowers absent. Stamen 1. Ovary 1-locular.

1. *A. vulgare* Targ. Tazz.

Plate LVII

Garni tal-Pipi
Small Lords-and-Ladies

Plant 20-40 cm. Leaves 6-12 x 4-10 cm., ovate to hastate-sagittate, obtuse or shortly mucronate, cordate at base; petiole long and slender, purple-spotted. Spathe 3-5 cm. long, erect, the basal part pale green with longitudinal stripes of dull reddish-purple, the upper part dark green to purplish-brown. Appendix of spadix greenish. Female flowers 4-5. Berry green; seeds 2-6. $2n = c. 55$. Fl. 12-4.

Cultivated and waste places. *Malta* and *Gozo*: very common (S. & C.G.; Borg; Haslam; G. Lanfranco; Wolseley). *Comino*: common (S. & C.G.; Borg; Wolseley).

Mediterranean region; Atlantic Islands.

3. *Dracunculus* Miller

Stock a tuber. Leaves long-petiolate, deeply divided pedately into numerous segments. Spathe deciduous, the lower part convolute, with overlapping margins, closely enfolding the base of the spadix, the upper part more or less flat. Spadix about as long as spathe, with a short floral zone and a long, stout appendix. Flowers unisexual, without perianth; zones of male and female flowers of about equal length. Stamens 2-3. Ovary 1-locular; seeds few.

1. *D. vulgaris* Schott

Plate LVII

Garni Qoxret is-serp
Giant Lords-and-Ladies

Plant up to 100 cm. high. Leaves 15-20 x 25-35 cm., more or less reniform in outline; segments 9-15, elliptical to oblong-lanceolate, acute; petiole with long, wide, purple-spotted, sheathing base, concealing base of scape so as to make some leaves appear cauline. Spathe 20-40 cm. long, glabrous, with abaxial surface greenish and adaxial dark brownish-purple; upper part lanceolate, erect; margins undulate. Spadix with male and female zones almost contiguous; sterile flowers few, sometimes absent; appendix with short, pale stalk, the remainder dark purple. Berry orange-red. Fl. 3-5.

Sandy places. *Malta*: native in sheltered valleys at Wied iz-Zurrieq (G.D. Borg); Attard, Lija (Borg); frequently cultivated as a curiosity (Borg); cultivated at Argotti Gardens from plants collected at Wied iz-Zurrieq (Wolseley).

E. & C. Mediterranean region.

4. *Colocasia* Schott

Stock a depressed-globose tuber, with slender underground stolons. Leaves entire, peltate, long-petiolate, the lower part with overlapping margins, closely enfolding base of spadix. Spadix with short appendix, much shorter than spathe. Flowers unisexual without perianth. Male flowers separated from female by a gap bearing scale-like sterile flowers. Stamens 3, connate throughout their length to form a stout column. Ovary 1-locular; seeds fairly numerous.

1. *C. esculenta* (L.) Schott *C. antiquorum* Schott

Cherghas
Elephants-ear

Plant very robust, with large tuber and coarse foliage. Leaves up to 60 x 35 cm., cordate sagittate, shining, conspicuously veined, the lamina usually deflexed; petiole up to 100 cm. stout, inserted c. $\frac{1}{5}$ of the distance from sinus to apex of lamina. Scapes shorter than leaves. Spathe 20-45 cm. long, lanceolate, acuminate, the basal part which enfolds the spadix green, the upper part dull orange-yellow. Spadix less than half as long as spathe. Fl. 4-6.

Cultivated for the leaves which are eaten as spinach. *Malta*: Mta'leb, San Martin, Bahrija (S. & C.G.); Buskett (Borg).

Native of Tropical Asia? and America; widely cultivated throughout the tropics.

CVIII. LEMNACEAE

Small floating aquatic herbs. Roots simple or 0. Flowers monoecious, naked or initially enclosed in a sheath; perianth 0; male flowers consisting of 1-2 stamens; female flowers with one sessile unilocular ovary, with 1-7 ovules.

Thallus more or less flattened, with roots
Thallus subglobose, rootless

1. *Lemna*
2. *Wolffia*

1. *Lemna* L.

Frequently forming a green carpet on surface of stagnant water. Inflorescence minute, in margin of thallus and consisting of 1 female and 2 male flowers enclosed in a sheath. Anthers bilocular. Raphides occur throughout. Thallus variously interpreted as stem, leaf, or both.

1. *L. minor* L.

Common Duckweed

Thalli floating, opaque, entire, obovate or suborbicular, 1.5-4.0 mm. in diameter, nearly flat on both sides, each with a single root up to 15 cm. long. Raphides abundant. Seed c. 0.6 mm. $2n = 40$. Fl. 5-6.

Still water. *Malta*: Marsa (GD.); Girgenti (Borg); Argotti Gardens (Hasslam).

Cosmopolitan except for the polar regions and Tropics.

2. *Wolffia* Hork. ex Schleid.

Minute rootless floating aquatic herbs. Inflorescence borne in a hollow in the upper surface of the ovoid thallus, sheath 0; anthers unilocular

1. *W. arrhiza* (L.) Hork. ex Wimmer

Rootless Duckweed

Thallus 0.5-1.0 mm. in diameter, ovoid to ellipsoid or occasionally nearly globular, producing daughter thalli by budding from one end. No special resting thalli are produced, but the ordinary ones sink in winter. $2n = c. 50$.

Malta: Sa Madson Nursery Floriana, ? introduced (I.M. Evans).

Europe north to 54°; local; Africa; Asia; America; Australia.

PANDANALES

CIX. SPARGANIACEAE

Rhizomatous, perennial, aquatic herbs. Stems simple or branched, leafy. Leaves elongate-linear, sheathing at base, erect or floating. Flowers unisexual, crowded in separate globose heads, the female towards the base in each inflorescence. Perianth of 3-6, membranous, spatulate scales. Male flowers with 3 or more stamens, filaments sometimes partially united; female with a 1-celled, sessile ovary. Fruit dry, indehiscent, narrowed below, exocarp spongy. Wind pollinated.

1. *Sparganium* L.

The only genus.

1. *S. erectum* L.
- S. ramosum* Huds.

Plate LVIII

Branched Bur-reed

Erect, glabrous perennial (30-)50-150(-200) cm. high. Leaves 10-15 mm. wide, usually all erect, triangular in section. Inflorescence normally branched, with the male capitula borne above the female on the branches. Ovary usually bilocular. $2n = 30$. Fl. 4-7.

Wet valley bottoms. *Malta*: rare, Girgenti (S. & C.G.); Marsa (GD.); Għajjn il-Kbira (Borg).

North temperate regions.

CX. TYPHACEAE

Stout, rhizomatous herbs growing in shallow water. Stems erect, simple. Leaves distichous, elongate-linear, mostly radical. Flowers unisexual, very numerous, densely crowded on a terminal spadix, males above females. Flowers surrounded by slender jointed hairs or spatulate scales. Male flowers with 2-5 stamens; female with unilocular, stipitate ovary. Fruit dry, at length splitting. Wind-pollinated.

1. *Typha* L.

The only genus.

Leaves 10-18 mm wide; male and female parts of spadix contiguous

1. *latifolia*

Leaves c. 5 mm. wide; male and female parts of spadix 1.9 cm. apart

2. *angustifolia*

1. *T. latifolia* L.

Plate LVII

Buda rġieqa
Bulrush

Robust perennial, 1.5-2.5 m. high. Leaves (7-)10-18(-22) mm. wide, linear, overlapping the inflorescence. Male and female parts of inflorescence usually contiguous. Female flowers ebracteolate. Fruit cylindrical, tapering at base into a slender stalk. $2n = 30$. Fl. 4-7.

Water courses. *Malta*: rare (G. Lanfranco), as at Għejna, Fiddien (S. & C.G.; Borg); Marsa (GD.); Borg; Ta' Baldu (Borg; Wolseley); Għajjn il-Kbira (Borg); Chadwick Lakes (Hasslam).

From Arctic Circle to 30° S. except for C. and S. Africa, S. Asia, Australia and Polynesia.

2. *T. angustifolia* L.

Buda rġieqa
Lesser Bulrush

Robust perennial -3 m. high. Leaves (3-)4-5(-10) mm. wide, convex on the back. Male or female parts of inflorescence about equal in length, about 1-9 cm. apart, very rarely contiguous. Bracteoles of female flowers shorter than the stigmas. $2n = 30$. Fl. 4-7.

Water courses. *Malta*: rare, Għejna (S. & C.G.; Borg).

Widespread, but absent from America south of Louisiana and California, and from Africa.

CYPERALES

CXI. CYPERACEAE

Perennial, usually rhizomatous herbs, or annuals. Stems usually solid, often trigonous. Leaves usually linear, some or all reduced to sheaths. Spikelets solitary, terminal or grouped in branched or spike-like inflorescences, often subtended by bracts; 1-to many-flowered. Flowers hermaphrodite or unisexual, arising in the axil of a bracteole (*glume*). Perianth of 1-to many bristles or scales or, more often, 0. Stamens (1-)2-3(-6); anthers basifixed. Stigmas 2 or 3. Fruit a nut. Seed erect, embryo small. Flowers wind-pollinated.

- | | |
|--|---|
| 1. Flowers all unisexual; fruits enclosed in a utricle
Flowers hermaphrodite; fruits not enclosed in a utricle | 6. <i>Carex</i> |
| 2. Uppermost sheath on flowering stem without a blade
Uppermost sheath with at least a short blade | 1. <i>Eleocharis</i> |
| 3. Spikelets terete; flowers not distichously arranged
Spikelets more or less compressed; flowers distichously arranged | 2. <i>Scirpus</i> |
| 4. Stems triquetrous; spikelets more than 12-flowered
Stems terete; spikelets not more than 11-flowered | 3. <i>Cyperus</i> |
| 5. Plant caespitose
Plant rhizomatous | 4. <i>Schoenus</i>
5. <i>Galilea</i> |

1. *Eleocharis* R. Br.

Perennial herbs. Stems terete or rarely 4-angular; transverse section with numerous, approximately equal air-canals without bascular bundles at the intersections of the strips of tissue separating the canals. At least the upper sheaths leafless. Spikelet solitary, terminal, the lowest glume usually sterile. Flowers hermaphrodite. Perianth bristles present (rarely 0), shorter than or exceeding nut. Stamens 3 or 2. Style usually with a swollen persistent base.

- | | |
|--|---------------------|
| Rhizomatous perennial; spikelet 5-20 mm. long | 1. <i>palustris</i> |
| Densely caespitose annual; spikelet 2-5(-7) mm. long | 2. <i>ovata</i> |

1. *E. palustris* (L.) Roemer & Schultes Plate LVIII Common Spikerush

Perennial 10-60 cm. high, often more or less caespitose, but with creeping rhizomes. Stems 1-4 mm. in diameter, terete, glabrous, reddish at base; sheaths leafless, yellowish-brown, the upper more or less transversely truncate. Spikelet 5-20 x 1.5-4 mm., narrowly ovate, many-flowered. Glumes 2-3 mm. long, brown, with a green midrib and broad hyaline margins, ovate, apex more or less acute; two lowest glumes sterile, short, half encircling base of spikelet. Bristles shorter or longer than fruit, rarely 0. Stamens 3. Stigmas 2. Nut yellow to deep brown, ovoid, biconvex, very finely punctate. Fl. 3-6.

All material seen from Malta is referable to subsp. *microcarpa* S.M. Walters, which has $2n = 16$, and is the common subspecies in the Mediterranean region.

Along water courses in valleys. *Malta*: locally frequent (S. & C.G.; G. Lanfranco; Wolseley); as at Mtaħleb, Fiddien, Buskett, Wied Gerżuma, Wied Hzejjen, Ghaj

Mula, Ghajn Rihana (Borg); Qanotta Valley (Gauci), Gozo: Mgarr, Dħalet Qorrot (Borg).

Cosmopolitan.

2. *E. ovata* (Roth) Roemer & Schultes

Southern Spikerush

Annual 5-35 cm. high, densely caespitose. Stems erect, 1-2 mm. in diameter, terete, glabrous; reddish or green at base; sheath leafless, the upper green and transversely to obliquely truncate. Spikelet 2-7 x 1.5-3.5 mm., broadly ovate, many-flowered. Glumes 1.3-2 mm. long, brown, with a green midrib and broad hyaline margins, obovate, 2 lowest glumes sterile, short, more than half encircling the base of the spikelet. Bristles usually longer than fruit, scabrous. Stamens 3. Stigmas 2. Nut brown, obovate, compressed-ovoid, smooth. Fl. 3-5.

Rocky places in moist depressions. *Malta*: Wardija (Kramer & Westra).

C. & E. Europe; Asia; N. America.

2. *Scirpus* L.

Perennials. Stems triquetrous or terete, usually leafless. Inflorescence terminal, apparently lateral, with lowermost bract continuing beyond the inflorescence, sessile, capitate, or with short branches. Spikelets terete, ovoid, flowers not distichously arranged. Flowers hermaphrodite. Perianth of 6 (rarely fewer or 0) bristles which are rough with short downward-directed hairs. Stamens 3. Stigmas 3 or 2.

- | | | |
|---|--|----|
| 1. Stems filiform; plant 3-30 cm. tall
Stems stout; plant 40-300 cm. tall | 5. <i>cernuus</i> | 2. |
| 2. Stems triquetrous
Stems terete | 1. <i>maritimus</i> | 3. |
| 3. Spikelets 2-4 mm. long, sessile in globose heads
Spikelets 5-8 mm. long, at least some with peduncles | 2. <i>holoschoenus</i> | 4. |
| 4. Stems green; glumes smooth; stigmas usually 3
Stems glaucous; glumes dorsally papillose; stigmas 2 | 3. <i>lacustris</i>
4. <i>tabernaemontani</i> | |

1. *S. maritimus* L.

Sea Clubrush

A stout, glabrous perennial, 30-120 cm. high. Rhizome producing short runners, tuberos at tip. Stems triquetrous, scabrid above, leafy. Leaves up to 10 mm. wide, keeled, with scabrid margins. Inflorescence terminal, of densely clustered spikelets c. 5 cm. in diameter, reddish-brown; bracts leaf-like to setaceous, the larger longer than the inflorescence. Spikelets 10-20 mm. long, ovoid, red-brown, sessile or in groups of 2-5 at the ends of branches. Glumes c. 7 mm. long, ovate, apex bifid, awned from the sinus. Bristles shorter than the nut, brown. Stamens 3; filaments flattened. Nut c. 3 mm. long, broadly obovate from a cuneate base, plano-convex, brown, shining. $2n = 86$. Fl. 4-6.

Valleys near water. *Malta*: rare (G. Lanfranco); as at Marsa, Ghajn Mula (Borg); Ċnejna (Borg; Wolseley). Gozo: Wied Bingemma, San Blas (Borg).

Cosmopolitan except for the Arctic.

2. *S. holoschoenus* L.

Plate LVIII

Round-headed Clubrush

Perennial 50-100 cm. high, densely caespitose. Stamens 2-4 mm. in diameter, terete, glabrous; sheaths mostly without blades, the upper with 1-terete, rigid blades shorter than stem; margins scabrid. Inflorescence more or less umbellate of 1-5 heads, subtended by (1-)2 bracts, longer than the inflorescence. Heads 5-10 mm. in diameter, densely globose, sessile or peduncled; peduncles stout, flattened, with scabrid margins. Spikelets 2-4 mm. long, obovate, sessile. Glumes c. 2.5 mm. long, obovate, mucronate or almost 3-lobed, ciliate. Nut c. 1 mm. long, obovate-trigonal, crowned by the persistent style-base. Fl. 4-7.

Malta: locally frequent (G. Lanfranco; Wolseley); as at Buskett, Għirgenti, Pauls Bay, Mellieħa, Mistrā, Mtaħleb, Fiddien, Wied il-Qleigħa, Għnejna, Għajnejna, Bahrija (Borg); Wied il-Busħies (Kramer & Westra). Gozo: Wied il-Għasri, Xlendi, Mġarr, Dwejra (Borg).

W. Europe; Mediterranean region; Canaries; Asia.

3. *S. lacustris* L.

Common Clubrush

A stout, glabrous perennial 1-3 metres high. Rhizome creeping, often producing tufts of submerged leaves. Stems up to 1.5 cm. in diameter, terete, green, the upper sheath often with a short blade. Inflorescence apparently lateral with a leaf-like bract as long as, or shorter than the inflorescence, capitate or with several branches up to 7 mm. long. Spikelets 5-8 mm. long, ovoid, reddish-brown; glumes 3-4 mm. long, broadly ovate, terete, emarginate, often ciliate, with lateral vein and a short, often papillose awn. Anthers bearded at the apex. Stigmas usually 2. Nut c. 2.5 mm. long, bluntly trigonal, grey-brown. $2n = 38, 40, 42$. Fl. 4-6.

In ditches and valley pools. Malta: rare, Marsa, Wied Hanżir, Għajnejna, Għajnejna Rihana (Borg).

Europe; Asia; Africa; N. & C. America; Polynesia; Australia.

4. *S. tabernaemontani* C.C. Gmelin.

Grey Clubrush

S. lacustris var. *tabernaemontani* C.C. Gmel.

Differs from *S. lacustris* in the stems 50-150 cm. high, rather slender, glabrous, glumes dorsally covered with small, dark brown papillae; anthers not or scarcely bearded; stigmas 2; nut 2 mm. long, biconvex. $2n = 42$. Fl. 4-6.

In ditches and valley pools. Malta: rare at Għajnejna, Wied Hżejjen, Għajnejna Rihana (Borg).

Europe except N. Russia, the Arctic and Portugal; temperate Asia.

5. *S. cernuus* Vahl

Slender Clubrush

S. setaceus var. *filiformis* (Savi) Fiori

Slender, bright green, perennial or annual 2-30 cm. high, densely caespitose. Stems filiform. Leaves usually shorter than stems, channelled; sheaths reddish-brown. Bract shorter or slightly longer than inflorescence. Spikelets 1(-3). Glumes 1-2 mm. long, broadly ovate, brown to reddish-brown with green midrib, strongly chartaceous in fruit. Nut 0.8-1 mm. long, broadly trigonal-obovoid, reddish-brown, smooth to rugose. Fl. 4-7.

In damp places and along streams. Malta: local (G. Lanfranco); as at Mtaħleb, Għajnejna Rihana, (Borg; Wolseley); Għajnejna Mula, Fiddien, Wied Gerżuma, Bahrija (Borg).

W. & S. Europe; N. Africa.

3. *Cyperus* L.

Perennial, rhizomatous or rarely annual herbs. Stems triquetrous, usually leafy, sometimes winged. Inflorescence umbellate or capitate; bracts leaf-like. Spikelets rarely flowered. Flowers distichous, hermaphrodite, rarely some male or lowest sterile. Perianth 0. Stamens 3, sometimes reduced to 2 or 1. Stigmas 3, sometimes reduced to 2, united at the base. Nut trigonal or in species with 2 stigmas lens-shaped.

Inflorescence capitate

4. *distachyus*

Inflorescence umbellate, branches long or short

2.

Annual; glumes 1 mm. long

1. *fuscus*

Perennial; glumes 2.5-3 mm. long

3.

Longest branches of inflorescence 8-30 cm. long

2. *longus*

Longest branches of inflorescence less than 8 cm. long

3. *badius*

1. *C. fuscus* L.

Brown Galingale

Glabrous annual 5-20 cm. high, densely caespitose. Stems triquetrous, smooth, leaves 1-3 mm. wide, flat, keeled, lanceolate, narrowed to acute point, usually longer than the stems, soon withering. Inflorescence subcapitate or a dense umbel with few short branches up to 1 cm. long; bracts 3-5, leafy, much longer than the inflorescence; branches with loose membranous sheaths split almost to the base. Spikelets 4-5 mm. long; 11-19-flowered, oblong, compressed, numerous, clustered in heads. Glumes c. 1 mm. long, dark brown with broad reddish brown mid-vein, smooth, scarcely imbricate, ovate, acute. Stamens usually 2. Stigma 3. Nut 0.75 mm., compressed-trigonal, yellowish. $2n = c. 72$. Fl. 8-11.

Damp valleys. Malta: rare at Wied Hanżir and Mtaħleb (Borg).

W. & S. Europe; Asia; N. Africa; Madeira.

2. *C. longus* L.

Bordi

Sweet Galingale

Glabrous perennial 35-120 cm. high; rhizome ascending, covered with overlapping persistent scales. Stems sharply triquetrous, winged, glabrous. Leaves up to 20 mm. x 8 mm., lanceolate, narrowed to an acute point, plicate, strongly nerved, smooth serrate; sheaths tubular, soon splitting, fibres persistent. Inflorescence a compound irregular, compound umbel with at least some branches 8-30 cm. long; spikelets 2-3 overtopping umbel, leaf-like. Spikelets sessile, terminating the branches in fan-shaped clusters. Spikelets 1-2 cm. long, oblong, compressed; glumes 1-2 mm. long, brown to red-brown with green midrib, strongly folded, broadly ovate. Stamens 2. Stigmas 3. Nut c. 1.2 mm. long, trigonal, narrowly acute.

Damp valleys and cultivated places. Malta: frequent (Lanfranco; Wolseley); as at Mtaħleb, Għajnejna, Għajnejna, Bahrija, Fiddien, Mellieħa

(Borg). Gozo: Xlendi, Wied Lunzjata, Wied Bingemma, Ghajnsielem, San Blas, Ramla (Borg); Mgarr (Borg; Kramer & Westra).

Mediterranean region.

3. *C. badius* Desf. Plate LVIII
C. longus var. *badius* (Desf.) Fiori

Bordi or soghda
Compact Galingale

Differs from *C. longus* in being 80-100 cm. high; leaves up to 30 cm. x 4 mm.; umbel more compact with longest branches not exceeding 8 cm.; bracts 2-3; 1-2 overtopping umbel; spikelets 0.8-2 cm. long; glumes c. 2.5 mm. long, dark brown with green midrib; nut c. 1 mm. long, ovate-trigonal. Fl. 4-9.

Along streams, and in irrigated and damp places. Malta and Gozo: locally frequent (Borg; G. Lanfranco; Haslam; Wolseley).

Mediterranean region.

4. *C. distachyos* All.
C. laevigatus var. *distachyos* (All.) Fiori

Mediterranean Galingale

Glabrous perennial 10-30 cm. high, densely caespitose, rhizomatous. Stems triquetrous, smooth. Leaves usually with reduced blade, rarely up to 12 cm. long, linear, involute, with obtuse apex; sheaths tubular, the lower without blades, brown to reddish. Inflorescence a unilateral, terminal capitulum of 2-5 sessile spikelets; bracts usually 2, 1 an apparent extension of the stem overtopping the inflorescence, the lower, the lower reduced, bract-like. Spikelets 5-20 mm. long, 15 to 40-flowered, oblong, compressed. Glumes c. 2.5 mm. long, broadly ovate, obtuse or acute, pale brown to dark brown with a broad green midrib, imbricate. Stamens 2. Stigmas usually 2, joined at base. Nut 1.5-1.75 mm. long, lenticular, ovate, compressed, pale brown to cream. Fl. 4-10.

Damp valleys and irrigated places. Malta: rare (G. Lanfranco); as at Salini, Ghajn Mula, Ghajn-Rihana, Wied Bufula, Marsaskala, Marsa, Wied Hanzir (Borg). Gozo: Ramla, Xlendi, Mgarr ix-Xini, Dwejra (Borg).

Mediterranean region.

4. *Schoenus* L.

Perennial herbs. Stems terete. Inflorescence terminal, bracteate, of compressed spikelets, 1-4 flowered. Bracts of lowest spikelet encircling base of inflorescence. Flowers hermaphrodite; lower florets sterile. Perianth of 1-6 bristles. Stamens 3. Stigmas 3; style somewhat thickened at base, usually deciduous. Nut trigonous or nearly globular.

1. *S. nigricans* L. Plate LVIII

Black Bog-rush

Perennial 15-75 cm. high, densely caespitose. Stems glabrous, tough, wiry, leafy only at base. Leaves at least $\frac{1}{2}$ as long as stem, wiry, subterete, margins involute; lower sheaths dark brown to black, tough, shiny. Inflorescence 1-1.5 cm. long, ovoid, blackish. Lowest bract with leaf-like point 2-5 times as long as the inflorescence. Spikelets 5-8 mm. long, 5 or more in an inflorescence. Glumes distichous, keeled, scabrid on the keel. Bristles 3-5, shorter than the nut, often more or less 0. Nut 1-5 mm., white shiny, globular. $2n = 44$, Fl. 4-6.

Marshy, maritime places. Malta: rather rare, peninsula of Marfa (S. & C.G.; G. Lanfranco), Fiddien, Wied Gerżuma (S. & C.G.; Borg); Marsa, Gnejna (G.D.; Borg); Wied Ghasfura (Gulia; Borg); Bahrija (Borg).

S., C. & W. Europe; S. Africa; America

5. Galingale Parl.

Like *Cyperus* but stems terete; spikelets fewer-flowered.

1. *G. mucronatus* (L.) Parl. Capitulate Galingale
Cyperus mucronatus (L.) Mab.

Perennial 100-600 cm. high, caespitose or solitary, spreading extensively by unbranched rhizomes, scales orange-brown, persistent, becoming fibrous. Stems more or less erect, terete, stout, 1.5-4.5 mm. in diameter, leafy in lower $\frac{1}{2}$. Leaves 30-200 cm. x 2-5 mm. glaucous-green, linear-lanceolate, tapering to an acute apex, margins serrulate; sheaths membranous, tubular, dorsally fibrous, persistent. Inflorescence a terminal, globose capitulum of sessile spikelets; bracts 3-6, the outer 2-3 leafy, exceeding the inflorescence, the inner short, base inflated, usually with hyaline margins. Spikelets 1-2 cm. long, 5 to 11-flowered, oblong, slightly compressed. Glumes 6-8 mm. long, red-brown, broadly ovate, with hyaline margins, apex narrowed into a straight rigid awn 1-4 cm. long. Bristles 0. Stamens 2. Stigmas 3. Nut 2.5-3 mm. long, obovate-trigonal, grey-black Fl. 3-6.

Sandy places. Malta: rare (G. Lanfranco); as at Mellicha, Marfa, Gnejna (S. & C.G.; Borg). Gozo: Ramla (Borg).

Mediterranean region; Macaronesia.

6. *Carex* L.

Perennial, rhizomatous herbs. Stems solid, usually leafy, often triangular in section. Leaves more or less linear, leaf-base usually sheathing; ligule present at junction of leaf and sheath. Inflorescence various, from a much-branched panicle to a simple spike. Flowers unisexual, in 1-flowered spikelets each subtended by a glume. Male flowers with 2-3 stamens; perianth 0. Female flowers surrounded by a globular, trigonous or compressed perigynium, usually crowned by a beak from which the stigmas project. Ovary trigonous and stigmas 3, or biconvex and stigmas 2. Fruit a trigonous or biconvex nut enclosed within the perigynium.

- | | |
|--|--------------------|
| 1. Spikes heterosexual; stigmas 2 | 2. |
| Spikes with male and female parts clearly distinguished; stigmas 3 | 5. |
| 2. Rhizome far-creeping; stems not tufted; lowest bract much exceeding inflorescence | 7. <i>divisa</i> |
| Rhizome short; stems tufted; lowest bract not exceeding inflorescence | 3. |
| 3. Leaves 4-10 mm. wide; nut strongly ribbed | 8. <i>otrubae</i> |
| Leaves 2-4 mm. wide; nut smooth | 4. |
| 4. Inflorescence lax; lowest spike separated from the next by a space up to 4 times its own length | 9. <i>divulsa</i> |
| Spikes more or less contiguous; lowest spike separated from the next by a space 2 times its own length | 10. <i>spicata</i> |

5. Leaves c. 8 mm. wide; female spikes mostly over 5 cm. long
Leaves less than 6 mm. wide; female spikes not more than 4 cm. long

6. Male and female glumes dark-brown to purple
Male and female glumes green to pale brown

7. Spikes contiguous; bracts much exceeding the inflorescence
Inflorescence interrupted; bracts not exceeding inflorescence

8. Utricle 4.5 mm. long, sharply trigonous
Utricle 3-4 mm. long, bluntly trigonous

9. Utricles matt even when ripe, with distinct nerves
Utricles shining when ripe, without distinct nerves

1. *C. distans* L.

5. *hispida*

6. *flacca*

3. *extensa*

4. *hallerana*

1. *distans*
2. *punctata*

Soghda
Distant Sedge

Perennial 15-100 cm. high, densely caespitose; rhizomes short, scales dark brown or black. Stems trigonous, smooth. Leaves 10-15 x 0.2-0.6 cm., flat, lanceolate, acute, rigid, more or less erect, glaucous, sheaths persisting; ligule 2-3 mm. long, obtuse. Inflorescence compact at flowering, distant in fruit; bracts leaf-like, not exceeding the stem. Male spike 1, 15-30 mm. long; glumes 2.5-3.5 mm. long, ovate-oblong, apex mucronate, with greenish mid-vein and hyaline margins. Utricle 3.5-4.5 mm. long, green to brown, ovoid, acute, distinctly nerved; beak 0.75 mm. long, more or less scabrid, bifid. Stigmas 3. Nut trigonous, ellipsoid, yellow-brown. $2n = 74$. Fl. 4-5.

Damp valleys. *Malta*: frequent (G. Lanfranco; Wolseley); as at Mtaheb, St. Paul's Bay, Mellieha, Ahrax, Mistrà, Ta' Baldu, Wied Inčita, Buskett (Borg). *Gozo*: Ramla, Wied Ir-Rihan, Mgarr (Borg).

Europe to c. 60° N. in Scandinavia; W. Asia; N. Africa.

2. *C. punctata* Gaudin

Dotted Sedge

Plant 15-160 cm. high, caespitose, with short creeping rhizomes. Stems erect, trigonous. Leaves 10-50 cm. x 2.5 mm., flat or shallowly keeled, abruptly narrowed to a fine tip; sheaths persistent, orange or pink-brown; ligule c. 3 mm. long, obtuse, tubular at least on the stem. Inflorescence about half the length of the stem; bracts leaf-like, at least one exceeding the inflorescence. Male spike 1, 10-30 mm. long; glumes 3-4 mm. long, orange-brown, oblong-obovate, mucronate, often fimbriate. Female spikes 2-4, 5-25 mm. long, upper more or less contiguous, lower distant, ovoid-cylindrical, peduncles included; glumes 2.5-3.5 mm. long, red-brown with a green midrib and hyaline margin; obovate, acuminate or obtuse and mucronate. Utricles 3-4 mm. long, pale green, shining, obovoid-ellipsoid; beak 0.75 mm. long, bifid. Stigmas 3. Nut c. 2 mm. long, obovoid-trigonous, shining and punctate. $2n = 68$. Fl. 4-5.

Malta: rare at Gnejna (Delicata; Borg).

Western Europe from S.W. Norway southwards, Mediterranean region; rarely inland.

3. *C. extensa* Gooden.

Long-bracted Sedge

Plant 5-40 cm. high, caespitose, with short rhizomes. Stems rigid, bluntly trigonous, sometimes arcuate, solid. Leaves 5-35 cm. x 2-3 mm., grey-green or glaucous, rigid, thick, more or less keeled, involute, narrowed to an obtuse apex; sheaths fibrous, persistent; ligule up to 2 mm. long, obtuse. Inflorescence $\frac{1}{2}$ to $\frac{1}{3}$ the length of the stems; bracts leaf-like, usually reflexed, far exceeding the inflorescence. Male spike 1(-3), 5-25 mm. long; glumes 3-4 mm. long, red-brown, with paler midrib, obovate-elliptical, obtuse. Female spikes 2-4, 5-20 mm. long, contiguous or the lowest somewhat distant, subglobose to cylindrical; peduncles included or lowest more or less exserted; glumes 1.5-2 mm. long, red-brown, with pale midrib and more or less hyaline margins, broadly ovate, mucronate. Utricles 3-4 mm. long, obovoid or ellipsoid; beak 0.5-0.75 mm. long, terete, notched. Stigmas 3. Nut broadly ovoid-trigonous. $2n = 60$. Fl. 4-5.

Malta: recorded by Parlato (Borg).

Europe to c. 60° N.; W. Asia; N. Africa; N. America.

4. *C. hallerana* Asso

Southern Sedge

Plant 10-35 cm. high, densely caespitose, with short upright rhizome. Stems slender, arcuate, trigonous. Leaves up to 24 cm. x 1.5-2 mm., glaucous, arcuate, keeled, flat or convolute, narrowed to a fine point, with minutely serrulate margins; sheaths pale brown, persistent; ligule up to 1 mm. long, obtuse. Inflorescence interrupted; spikes subsessile or lower with peduncles up to 70 mm. long; bracts leafy, shorter than the inflorescence. Male spikes 1-2, 10-20 mm. long; glumes 5-6 mm. long, red-brown with a pale midrib and hyaline margin, narrowly ovate, obtuse to acute. Female spikes 1-3, 7-10 mm. long, with 3-10 florets, cylindrical, erect, the upper sessile, the lower often remote, long-peduncled and arising from the lower $\frac{1}{2}$ of the stem; glumes 4-5 mm. long, red-brown with a broad midrib and hyaline margin, broadly ovate, rounded with mucronate apex. Utricle 4-5 mm. long, ovoid, sharply trigonous; beak up to 0.4 mm. long, acute. Stigmas 3. Nut ovoid, trigonous. Fl. 3-6.

Moist and shady places in valleys. *Malta*: rare at Wied Babu, Wied ġ-Żurrieq, Ta' Kandja, Wied Hanžir (Borg).

C. & S. Europe; W. Asia; Africa.

5. *C. hispida* Willd.

Hispid Sedge

Plant 25-100 cm. high, caespitose, with horizontal underground rhizome and dark brown, shining, persistent scales. Stems stout, rigid, trigonous or subterete. Leaves up to 75 cm. x 8 mm., light green, strongly keeled, plicate below, flat above, narrowed to an acute apex; sheaths brown, persistent; ligule up to 2 mm. long, obtuse. Inflorescence $\frac{1}{2}$ - $\frac{1}{3}$ the length of the stem; bracts leaf-like, the lowest far exceeding the inflorescence. Male spikes 3-5, 2-7 cm. long, sessile or with peduncles up to 10 mm. long; glumes 5-7 mm. long, sessile or with peduncles up to 10 mm. long; glumes 5-7 mm. long, hyaline, translucent to brown, oblanceolate, obtuse. Female spikes 2-3, uppermost sometimes male at top, 2-9 cm. long, contiguous, dense, cylindrical, erect, the upper subsessile, the lower often with a peduncle up to 5 mm. long; glumes 5-7 mm. long, hyaline, translucent to dark brown with a green midrib, ovate-lanceolate, narrowed to an awn-like apex. Utricle 3-4 mm. long, obovate, plano-convex, hispid; beak up to 0.75 mm., acute. Stigmas 3. Nut obovate, biconvex. Fl. 4-5.

Malta: rare; Mtahleb (Borg).

Mediterranean region.

6. *C. flacca* Schreb. subsp. *cuspidata* (Host) Ascherson ex Graebner
C. diversicolor var. *cuspidata* sensu Borg Glaucous Sedge

Plant 10-60 cm. high, loosely caespitose, with horizontal, underground rhizome and brown to red-brown, persistent scales. Stems rigid, trigonous-subterete. Leaves up to 40 cm. x 4 mm., glaucous, more or less rigid, arcuate, keeled or flat, narrowed to a fine point, margins serrulate; sheaths brown, persistent; ligule up to 2 mm. long, obtuse. Inflorescence about $\frac{1}{2}$ - $\frac{3}{4}$ the length of the stems; bracts leaf-like, the lowest often exceeding the inflorescence; spikes subsessile or with rough peduncles up to 2.5 cm. long. Male spikes 1-3, 10-35 mm. long; glumes 5-6 mm. long, purple-brown with pale midrib and hyaline margin; oblanceolate, rounded to subacute. Female spikes 1-3, 15-40 mm. long, contiguous, cylindrical, erect, subsessile, often male at the top; glumes 4-6 mm. long, dark brown with a pale midrib, oblong-ovate, with a rigid, acute apex. Utricle 3-4 mm. long, obovoid, trigonous, often inflated on adaxial side, minutely papillose; beak 0.2 mm., truncate. Stigmas 3. Nut ellipsoid, trigonous. Fl. 3-7.

Valleys and humid places. Malta and Gozo: locally common (S. & C.G.; Borg; G. Lanfranco).

Mediterranean region.

7. *C. divisa* Hudson Soghda
incl. var. *chaetophylla* Steudal Divided Sedge

Perennial 15-80 cm. high, caespitose; rhizomes branched, creeping, woody, shoot arising from short lateral branches; scales brown, ribbed, some becoming dark and fibrous. Stems filiform, trigonous, scabrid above. Leaves 15-60 x 0.15-0.3 cm., glaucous, lanceolate, acute, rigid, more or less flat or involute; ligule 2-3 mm. long, obtuse, more or less tubular. Inflorescence 1-3 cm. long, more or less dense; bracts leaf-like or setaceous, lowest usually exceeding inflorescence. Spike 3-8, contiguous, 3-13 mm. long, upper male above and female below, lower usually all female. Male glumes 3.5-4.5 mm. long, pale red-brown, ovoid, plano-convex; beak 0.5-0.75 mm. long, bifid. Stigmas 2. Nut suborbicular, biconvex. Fl. 5-6.

Damp places. Malta: locally common (S. & C.G.; Borg; G. Lanfranco; Haslam; Wolseley).

Atlantic coast of Europe from Belgium southwards; Mediterranean region; W. & C. Asia; S. Africa; rarely inland.

8. *C. otrubae* Podp. Soghda
C. vulpina sensu Borg False Fox-sedge

Perennial 30-100 cm. high, densely caespitose; with short rhizomes. Stems trigonous, hardly winged on angles, smooth below, scabrid above. Leaves up to 6 cm. x 4-10 mm., bright green, more or less erect, keeled; sheaths white with green veins, becoming brown; ligule 5-10 mm. long, more or less acute, tubular. Inflorescence an elongate panicle becoming dense in fruit; lower bracts setaceous, about as long as inflorescence. Spikes numerous, 8-14 mm. long, few-flowered, upper male, lower female. Glumes pale orange-brown with green midrib; male glumes 3.5-4 mm. long, oblanceolate-elliptical; female glumes 4-5 mm. long, ovate, acuminate. Nut 5-6 mm. long, dark brown and strongly ribbed at maturity, oblong-obovoid,

biconvex, cuticle epidermis cells elongate and thin walled; beak 1-1.5 mm. long, scabrid at apex, bifid. $2n = 60$. Fl. 4-6.

Along streams and in damp places. Malta and Gozo: locally frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Europe; N. Africa; W. & C. Asia.

9. *C. divulsa* Stokes Plate LVIII Grey Sedge
C. muricata var. *divulsa* (Stokes) Fiori

Perennial 25-75 cm. high, densely caespitose; rhizomes short, scales dark brown, soon becoming fibrous. Stems trigonous, scabrid. Leaves up to 75 cm. x 2-3 mm., more or less scabrid below, flat or channelled, often overwintering; sheaths forming false stems in sterile shoots; ligule c. 2 mm. long, obtuse. Inflorescence 5-15 cm. long; lower bracts setaceous, 2-3 cm. long, upper glumaceous. Spikes 5-8, few-flowered, the upper contiguous, 3-8 mm. long, all female, the lower distant, sometimes branched, 5-15 mm. long, male at top, female below. Male glumes 3.5-4 mm. long, lanceolate, acute; female glumes 3-3.5 mm. long, ovate-elliptical, acute. Nut 3.5-5 mm. long, obovoid, biconvex, yellow-brown; beak c. 1 mm. long, bifid. Stigmas 2. Fl. 4-6.

Valleys and humid places. Malta: local (G. Lanfranco); as at Buskett (S. & C.G.; Borg; Haslam); Girgenti, Ghajn il-Kbira, Wied Incita, Gnejna, Fiddien, Wied Ghomor (Borg); Wied Has-Saptan (Wolseley).

Europe to 59° N.; N. Africa; temperate Asia; introduced in N. America.

10. *C. spicata* Hudson Spiked Sedge

Perennial 10-75 cm. high, densely caespitose; rhizomes short, scales brown, soon becoming fibrous. Stems trigonous. Leaves 7-45 cm. x 2-4 mm., flat or more or less keeled; sheaths often forming a false stem, more or less persistent; ligule 3-5 mm. long. Inflorescence 1-4 cm. long; bracts setaceous for most of their length. Spikes 3-8, 5-10 mm. long, more or less contiguous, sessile, male at top, female below, or lower spikes entirely female. Glumes pale brown with green midrib; male glumes 3-4 mm. long, lanceolate-elliptical; female glumes 3-4.5 mm. long, ovate. Nut 4.2-5.3 mm. long, greenish when ripe, bulbous at base tapering into a serrulate beak c. 1.5 mm. long. $2n = c. 58$. Fl. 7-8.

In damp shady places. Malta: Girgenti (Wolseley).

Mediterranean region, Europe except the Arctic; N. Africa; Madeira; W. Asia; introduced elsewhere.

GRAMINALES

CXII. GRAMINEAE

Annual or perennial herbs, sometimes woody. Leaves with silicified cells (silica cells) on the lower epidermis in 1-2 rows beneath the vascular bundles. Stems solitary or caespitose, in perennials of 2 kinds, flowering culms and sterile or vegetative shoots. Culms cylindrical to somewhat flattened, solid at the nodes and usually hollow in the internodes. Leaves solitary at the nodes and consisting of a sheath, ligule and lamina, the sheath encircling the stem, the ligule a small whitish mem-

branous structure, flap of tissue or a ring of hairs at the junction between the sheath and the lamina, rarely 0, the lamina usually long and narrow with parallel venation. Inflorescence various, rarely consisting of 1 to many spikelets, arranged in spikes, panicles, racemes or false racemes in which a sessile spikelet is accompanied by a pedicelled spikelet or its rudiment. The spikelet consists usually of a pair of bracts like scales at the base (*glumes*), a fragile or tough axis (*rachilla* or *rachis*), and 1 to several florets. Flowers usually hermaphrodite, sometimes unisexual, usually consisting of stamens and stigmas and (0-) 2 or 3 minute hyaline scales (*lodicules*), enclosed and sessile between 2 bracts, the lower *lemma*, and upper *palea*, the whole called a *floret*. Stamens hypogynous, 1 or 3, consisting of long delicate filaments and 2-locular anthers, opening by longitudinal slits or occasionally by pores; ovary 1-celled; ovules solitary; styles (1-)2(3); stigmas usually plumose; caryopsis 1-seeded, indehiscent, rarely with mucilage-forming pericarp; embryo abaxial, large or small.

1. Spikelets monocious; male and female spikelets on the same plant, but no hermaphrodite spikelets present
Spikelets hermaphrodite or occasionally a hermaphrodite spikelet accompanied by a male or reduced spikelet
2. Inflorescence terminal, entirely enclosed in a chartaceous bract
Inflorescence not as above
3. Inflorescence a terminal spike of more or less sessile spikelets
Inflorescence a racemously branched panicle, spike-like with pedicelled spikelets, effuse, or of several spikes
4. Spikelets unilaterally arranged on the rachis
Spikelets not unilaterally arranged on the rachis
5. Inflorescence somewhat lax; spikelets all fertile
Inflorescence dense; spikelets dimorphic, fertile and sterile mixed in the same cluster
6. Spikelets sunk in cavities in the rachis
Spikelets not sunk in cavities in the rachis
7. Spikes arcuate; auricles absent from leaf-base
Spikes straight; auricles present at leaf-base
8. Lower glume missing except in terminal spikelet
Lower glume present
9. Spikelets 3 at each node of the rachis
Spikelets solitary at each node of the rachis
10. Glumes and/or lemmas awned, with awns more than 2 mm. long in *Triticum aestivum* the lemma sometimes has an awn reduced to a short apical tooth
Glumes and lemmas without awns or with short awns less than 2 mm. long

63. *Zea*

64. *Lygeum*

3. *Catapodium*

5. *Cynosurus*

25. *Parapholis*

26. *Monerma*

12. *Lolium*

24. *Hordeum*

11. Glumes and lemmas with 2-3 awns or teeth
Glumes without awns; lemmas with a single awn from lanceolate tip

12. Inflorescence of closely contiguous sessile spikelets
Inflorescence of shortly pedicelled spikelets arranged at intervals along the axis

13. Spikelets terete
Spikelets laterally slightly compressed

14. Spikelets ovate, acute
Spikelets oblong, or cuneate

15. Inflorescence a spike composed of spikelets arranged digitately or laterally on the rachis
Inflorescence a spike-like or much-branched panicle

16. Spikes digitately arranged at the top of the rachis
Spikes arranged along the rachis

17. Spikelets laterally compressed; ligule a ring of hairs
Spikelets dorsally compressed; ligule reduced and membranous

18. Spikelets unilaterally arranged on the rachis
Spikelets not unilaterally arranged on the rachis

19. Spikelets with 10-18 florets; leaves distichously arranged
Spikelets with 2 florets; leaves spirally arranged

20. Inflorescence unilateral on the rachis
Inflorescence branched around the rachis

21. Spikelets dimorphic, fertile and sterile mixed in the same cluster
Spikelets all bearing fertile florets

22. Lemmas obtuse, awnless
Lemmas acute, with a scabrid awn

23. Pedicels glabrous; lemmas acute, with short awn up to 1.5 mm. long
Pedicels white-hairy; lemma with bifid tip; long-awned from the sinus

24. Inflorescence with sessile and long-pedunculate spikelets
Inflorescence of similar spikelets

25. Pedicels of racemes long-hairy
Pedicels glabrous

26. Spikelet-pedicels bearing one to several bristles
Spikelet-pedicels without bristles, but frequently awned

21. *Aegilops*

22. *Triticum*

19. *Brachypodium*

20. *Trachynia*

7. *Desmazeria*

23. *Agropyron*

53. *Cynodon*

56. *Digitaria*

59. *Paspalum*

51. *Aeluropus*

57. *Echinochloa*

5. *Cynosurus*

3. *Catapodium*

8. *Dactylis*

14. *Lamarckia*

61. *Hyparrhenia*

62. *Sorghum*

60. *Setaria*

| | |
|--|---|
| 27. Spikelets conspicuously awned
Spikelets not awned | |
| 28. Spikelets more or less sessile on the branches, pedicels less than 3 mm.
Spikelets with long pedicels exceeding 3 mm. | |
| 29. Spikelets in globose or ovoid capitula, the width more than $\frac{1}{2}$ the length
Spikelets in oblong capitula, less than $\frac{1}{2}$ as wide as long or in a branched panicle | |
| 30. Capitula prickly
Capitula softly hairy | 9. <i>Echinaria</i> |
| 31. Spikelets 2- to 3-flowered
Spikelets 1-flowered | 42. <i>Trisetum</i> |
| 32. Leaves convolute, 2.5-4 mm. wide
Leaves flat, (2-)4-14 mm. wide | 34. <i>Triplachne</i>
36. <i>Lagurus</i> |
| 33. Rachis solitary
Rachis branched | |
| 34. Spikelets 1-flowered
Spikelets several-flowered | |
| 35. At least some awns geniculate and twisted below
Awns straight | |
| 36. Awns 6-30 cm. long, rigid
Awns 3-15 mm. long, slender | 49. <i>Stipa</i> |
| 37. Glumes 1-veined, with swollen, hairy bases
Glumes strongly 7-veined, not swollen at base | 33. <i>Gastridium</i>
40. <i>Gaudinopsis</i> |
| 38. Awn arising from lower $\frac{1}{2}$ of lemma
Awn arising from tip of lemma | 31. <i>Alopecurus</i>
37. <i>Polypogon</i> |
| 39. At least some awns geniculate and twisted below
Awns erect or curved | 44. <i>Anthoxanthum</i> |
| 40. Lemma lanceolate, involute, narrowed into an awn; stamens usually 1
Lemma bifid at the apex with an awn arising from the sinus; stamens 3 | 11. <i>Vulpia</i>
18. <i>Bromus</i> |
| 41. Awn geniculate
Awn erect | |
| 42. Spikelets 2-4 mm. long
Spikelets 6-30 mm. long | 38. <i>Aira</i>
39. <i>Avena</i> |
| 43. Inflorescence spike-like; branches short
Inflorescence lax and more or less spreading; branches long | 11. <i>Vulpia</i> |

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| 28. Spikelets more than 10 mm. long
Spikelets 3-4 mm. long | 18. <i>Bromus</i>
50. <i>Oryzopsis</i> |
| 29. Spikelets concealed and enclosed in an inflated sheath on involucre
Spikelets not concealed | 46.
47. |
| 30. Inflated sheath a coriaceous, cup-shaped involucre
Inflated sheath leaf-like, lanceolate | 32. <i>Coranacopias</i>
55. <i>Crypsis</i> |
| 31. Spikelets shortly pedicelled on the solitary rachis
Spikelets with long or short pedicels on branches | 35. <i>Phicum</i>
48. |
| 32. Pedicels of the spikelets less than 3 mm. long
Pedicels of the spikelets more than 4 mm. long | 48.
59. |
| 33. Panicle dense, ovate or oblong; branches short or ascending
Panicles interrupted or branches spreading | 50.
58. |
| 34. Spikelets with fine silky hairs as long as the glumes
Spikelets glabrous or shortly hairy | 51.
53. |
| 35. Leaf lamina involute; ligules membranous, c. 1 cm. long
Leaf lamina flat; ligule reduced, or a ring of hairs | 47. <i>Ampelodesma</i>
52. |
| 36. Lemmas dorsally rounded, long hairy; axis glabrous
Lemma cymbiform, glabrous on dorsal surface; axis long-hairy | 45. <i>Arundo</i>
46. <i>Phragmites</i> |
| 37. Leaves distichously arranged
Leaves spirally arranged | 54. <i>Sporobolus</i>
54. |
| 38. Ligule a ring of hairs
Ligule membranous or reduced | 48. <i>Schizanthus</i>
55. |
| 39. Glumes winged on the dorsal surface
Glumes not winged on the dorsal surface | 43. <i>Phalaris</i>
56. |
| 40. Leaf lamina rigid, involute, glabrous on outer surface
Leaf lamina more or less flaccid, flat, softly hairy | 29. <i>Ammophila</i>
57. |
| 41. Lemmas closely involute, subulate, apex bifid, with a short awn from the sinus
Lemmas ovate-lanceolate, apex acute, narrowed into a short awn | 4. <i>Acclitua</i>
41. <i>Lophochlaena</i> |
| 42. Branches flexuous, slender
Branches rigid | 52. <i>Eragrostis</i>
59. |
| 43. Panicle conspicuously dichotomously branched
Panicle not dichotomously branched | 6. <i>Cutandia</i>
16. <i>Puccinellia</i> |
| 44. Spikelets 1- to 3-flowered
Spikelets 4- to 20-flowered | 61.
63. |

61. Branches of the panicle in whorls
Branches of the panicle not whorled, sometimes in pairs
62. Glumes markedly unequal, the upper $\frac{1}{2}$ longer than the lower
Glumes more or less equal
63. Glumes 3-veined
Glumes 1-veined
64. Glumes subequal; anthers and stigmas not conspicuously coloured
Glumes unequal; anthers orange, stigma purple
65. Spikelets pendulous, more or less orbicular; glumes more or less equal
Spikelets erect, not orbicular; glumes unequal
66. Spikelets on clavate pedicels
Spikelets on slender pedicels
67. Leaves with auricles at junction of lamina and sheath; ligules reduced to a ridge
Leaves without auricles; ligules membranous, over 2 mm. long
68. Spikelets 3-10 mm. long
Spikelets 10-25 mm. long

2. *Catabrosa*

28. *Milium*
30. *Agrostis*

27. *Melica*
58. *Panicum*

1. *Briza*

13. *Sphenopus*

10. *Festuca*

15. *Poa*
17. *Glyceria*

Tribe Festuceae Dumort. Annual or perennial. Leaves various, sheaths sometimes tubular, with circular or oblong silica-bodies; ligule membranous. Inflorescence an open or contracted panicle, or a solitary spike. Spikelets pedicelled or sessile, all alike, laterally compressed, 2- to many-flowered; hermaphrodite, or some hermaphrodite and some sterile, the latter consisting of empty glumes and lemma. Rachilla disarticulating above the upper glume and between the florets. Glumes usually persistent, more or less equal, or the lower shorter or absent, the lower 1-veined, the upper 3-veined; lemma 5-13-veined with or without awn, the lower 2-keeled; stamens 3, rarely 1. Chromosomes large; base number 7.

1. *Briza* L.

Annuals or perennials. Leaves flat. Panicle more or less branched, branches in form. Spikelets ovoid or broadly triangular, compressed, usually pendulous. Glumes persistent, subequal, almost orbicular when flattened, keeled; lemma orbicular, obovate, cordate at base, 2-keeled, awnless. Stamens 3.

Spikelets 3-7 mm. long; panicles loosely divided, usually with many spikelets
Spikelets 14-25 mm. long; panicles sparingly divided, with few spikelets

1. *B. minor* L.

Annual 10-60 cm. high. Culms laxly with 2-4 nodes, smooth. Leaves 3-10 x 3-9 mm., narrowly lanceolate, scabrid above and on the margins; ligule 2-3 mm. long, obtuse. Panicles 4-20 x 2-10 cm., effuse; branches finely divided; pedicels

1. *minor*
2. *maxima*

Peat

mm. long, filiform, curved. Spikelets 3.5 x 3.5 mm., orbicular, nodding 4- to 8-flowered. Glumes persistent, hooded at the apex. Lemmas strongly concave, glabrous, becoming hardened and shining in the centre with broad white membranous margins. Anthers 0.6 mm. long. $2n = 10$. Fl. 3-5.

Valleys. Malta: frequently cultivated and naturalised (Borg).

S. Europe and Mediterranean region east to India; naturalised elsewhere.

2. *B. maxima* L.

Plate LIX

Bezzet il-Qattusa
Quaking-grass

Annual 10-60 cm. high. Culms laxly caespitose or solitary with 2-4 nodes, smooth. Leaves 5-20 cm. x 3-8 mm., acuminate, scabrid only on the margins; ligule 2.5 mm. long, obtuse. Panicle 3-10 cm. long, sparingly branched, with 1-12 spikelets; branches scabrid, with 1-3 spikelets; pedicels 6-20 mm. long curved, filiform. Spikelets 14-25 x 8-15 mm., ovate to oblong, more or less glabrous, 7- to 8-flowered. Glumes persistent, deeply concave. Lemma dorsally rounded, cordate at base, glabrous or with minute glandular hairs on indurate centre of the back and finely pubescent on the broad membranous margins. Anthers up to 2 mm. long. $2n = 14$. Fl. 3-5.

Open rocky places in valleys. Malta, Gozo and Comino: common (S. & C.G.; Borg; G. Lanfranco; Haslam; Wolseley).

Mediterranean region; Macaronesia; S. Africa; introduced elsewhere.

2. *Catabrosa* Beauv.

Perennials. Leaves flat. Panicle spreading. Branches clustered in half-whorls. Spikelets numerous, subterete, usually of 2 florets; pedicels short. Glumes persistent, unequal, the lower almost orbicular, veinless, the upper broadly elliptical, 3-veined; lemma with a truncate or cuneate hyaline apex, prominently 3-veined.

3. *aquatica* (L.) Beauv.

Plate LIX

Whorl-grass

Perennial 5-75 cm. high, stoloniferous. Culms erect or geniculate, unbranched, smooth. Leaves 4-14 cm. x 2-10 mm., linear, obtuse, bright green; ligule 2-8 mm. long, irregularly dentate. Panicles 5-30 x 2.5-10 cm., erect, effuse; branches clustered in half-whorls; pedicels short. Spikelets 3-5 mm. long, 1- to 3-flowered. Glumes persistent, smooth, obtuse, unequal, the lower 1-1.5 mm. long, ovate to elliptical, the upper 1.5-2.5 mm. long, broader. Lemma truncate, dorsally rounded, glabrous. Anthers c. 5 mm. long.

Long streams. Malta: rare (G. Lanfranco); at Gnejna (G.D.; S. & C.G.; Borg); Għajr Muja (Borg); Għajr Rihana (Borg; Wolseley); Mista (Wolseley).

W. of Europe; N. and W. Asia; Algeria; ?N. America.

3. *Catapodium* Link

Perennial. Leaves flat. Panicle rigid, unilateral, shortly branched below. Spikelets 1-12-flowered, compressed, usually appressed to the rachis or branches. Glumes

more or less equal, keeled; lemmas dorsally rounded, longer than glumes. Stamens 3.

1. Panicle spike-like, with a rigid rachis and almost sessile spikelets; lemmas 2.5 - 3.8 mm. long
Panicles lax or dense, with a slender rachis and branches; spikelets with short-pedicels; lemmas 2-2.5 mm. long
2. Lemma acute or mucronate, keeled, distinctly veined
Lemma obtuse, slightly keeled towards the apex, faintly nerved
3. *marinum*
1. *rigidum*
2. *hemipoa*

1. *C. rigidum* (L.) C.E. Hubbard Plate LIX Fern-grass
Sclerochloa rigida (L.) Link

Annual 2-30 cm. high; caespitose or solitary. Culms with 2-5 nodes, rigid, smooth. Leaves 1-10 cm. x 0.5-2 mm., flat or involute, acuminate; ligules 1-3 mm. long, obtuse. Panicle 1-8 x 2.5 cm., more or less dense, rigid, unilateral; branches rigid, 3-angled, smooth; pedicels up to 1.5 mm. long. Spikelets 4-7 x 1-1.5 mm., appressed to one side of the axis; branches 3- to 10-flowered. Glumes persistent, acute, slightly unequal; the lower lanceolate, 1-3-nerved, the upper elliptical, 3-nerved. Lemmas exceeding the glumes, obtuse, dorsally rounded. Anthers c. 0.3 mm. long. Fl. 3-5.

Valleys, roadsides, waste and cultivated places. *Malta, Gozo and Comino*: common everywhere (S. & C.G.; Borg; G. Lanfranco; Wolseley).

W. and S. Europe; N. Africa; W. Asia; introduced elsewhere.

2. *C. hemipoa* (Del.) Lainz Mediterranean Fern-grass

Annual 5-35 cm. high. Culms solitary or caespitose, green or reddish, erect or geniculately ascending, branched at base, terete; nodes 1-3, dark red to black. Leaves up to 7 cm. x 2 mm., flat or involute, linear-lanceolate, glabrous, swollen at junction of blade with sheath into a small auricle; ligule up to 4 mm. long, acute, with hyaline margin which continues along sheath; sheaths rounded. Panicle 1.5-10 cm. long, spike-like or with more or less spreading branches; rachis and branches angular, scabrid; pedicels 0.5-1 mm. long. Spikelets 3-10 mm. long, 5-15-flowered, more or less sessile or on short branches. Glumes more or less equal, 1-veined, lanceolate, acute, keeled. Lemmas c. 3 mm. long, ovate, obtuse with hyaline margins, dorsally rounded, keeled in the upper $\frac{1}{2}$, faintly nerved. Palea membranous, scabrid on the margins. Fl. 3-5.

Valleys and cultivated places. *Malta, Gozo and Comino*: frequent (Borg; G. Lanfranco).

Mediterranean region.

3. *C. marinum* (L.) C.E. Hubbard Sea Fern-grass
C. loliaceum (Huds.) Link

Annual 3-20 cm. high. Culms caespitose or solitary, rigid, smooth. Leaves 1-10 cm. x 1-3.5 mm., flat or involute, narrowed to an obtuse apex; ligules 0.5-3 mm.

long, obtuse. Panicle 5-70 x 4-12 mm., spike-like, rachis flattened dorsally and angular centrally. Spikelets 4-9 mm. long, 4-12-flowered, subsessile in 2 rows on one side of the axis. Glumes persistent, more or less equal, the lower lanceolate, 1-3 veined, the upper ovate or oblong, 3-veined. Lemmas exceeding the glumes, obtuse, rounded at base of dorsal surface, keeled above, scabrid on the keel. Anthers 0.5-1 mm. long. $2n = 14$. Fl. 3-5.

Rocky arid places. *Malta, Gozo and Comino*: frequent (Borg; G. Lanfranco).

Mediterranean region and Western Europe.

4. *Avellania* Parl.

Annuals. Leaves involute. Panicle more or less spike-like, with erect branches closely divided. Spikelets 3-4-flowered, the upper frequently sterile. Glumes markedly unequal, the upper 4 times longer than the lower. Lemmas bivalve, bifid at apex; awn arising from sinus, less than 3 mm. long. Stamens 1.

1. *A. michelii* Parl.

Michel's Grass

Annuals 5-40 cm. high. Culms caespitose or solitary, more or less erect, shortly pubescent with 1-3 nodes. Leaves 10-90 x 0.5-1.5 mm., lanceolate, narrowed to a fine point, involute, pubescent; ligule short, lacinate; sheaths turning pink to purplish. Panicle 3-11 x 0.5-1.5 cm., dense to somewhat interrupted; branches erect, unequal in length, in clusters at nodes. Spikelets 4-5 mm. long, shortly pedicelled, compressed. Glumes unequal; upper as long as the spikelet (excluding awn), broadly ovate, 3-veined, with bifid apex, shortly awned from the sinus; lower 1-1.2 mm. long, subulate, 1-veined, almost entirely hyaline. Lemmas 2-3 mm. long (excluding awn), closely involute, appearing parallel-sided, apex bifid; awn arising from the sinus, 1-3 mm. long, straight. Anthers c. 0.6 mm. long.

Arid, herbaceous places. *Malta*: rare at Għgant (S. & C.G.; Borg); Għajna il-Kbira, Inquisitor's Palace (Borg).

Mediterranean region.

5. *Cynosurus* L.

Annual or perennial. Leaves flat. Panicle spike-like. Spikelets more or less sessile, dimorphic; upper fertile, laterally compressed, 1-5 flowered; lower sterile, concealing upper. Glumes persistent, more or less equal, lanceolate. Lemmas dorsally convex, 3- to 5-veined, mucronate or awned at apex. Stamens 3.

Perennial; panicle oblong; 1-14 cm. x 4-10 mm.

1. *cristatus*

Annual; panicle globose, 2-5 cm. x 10-20 mm.

2. *echinatus*

1. *C. cristatus* L.

Crested Dog's tail

Perennial 5-75 cm. high, compactly caespitose. Culms with 1-3 nodes, smooth, stiff, unbranched. Leaves up to 15 cm. x 1-4 mm., linear; acute or acuminate; ligule 0.5-1.5 mm. long, obtuse. Panicles 1-14 cm. x 4-10 mm., rigid, dense; axis scabrid or minutely hairy; branches very short. Spikelets in dense clusters; fertile 3-6 mm. long, 2-5-flowered, oblong or cuneate. Glumes persistent, 3-5 mm. long,

keeled, 1-veined. Lemmas exceeding the glumes, 5-veined; apex with awn up to 1 mm. long. Anthers about 2 mm. long. $2n = 14$. Fl. 4-6.

Valleys. *Malta*: very rare at Wied Babu and Ramla tal-Marokk (Delicata; Gulla Borg).

Europe except the extreme north; Caucasus and N. Anatolia.

2. *C. echinatus* L.

Plate LIX

Rough Dog's-tail

Annual 20-50 (-70) mm. high. Culms solitary or fasciculate, smooth and glabrous. Leaves up to 15 cm. x 7 mm., linear, acute, glabrous, scabrid above, smooth below. Panicle 2-6 x 1-2 cm., erect, dense, ellipsoid or globular, unilateral; branches short. Fertile spikelets 2-3-flowered; sterile spikelets consisting of 7-15 awned sterile glumes broadly linear-lanceolate. Lemmas scabrid towards apex; tipped with an awn 2-3 times as long as lemma. Anthers 2.5-4 mm. long. Fl. 3-5.

On rocky ground in valleys. *Malta* and *Gozo*: locally frequent (Borg; G. Lanfranco; Wolseley).

Europe except the north; Caucasus; N. Atlantic; Azores.

6. *Cutandia* Willk.

Much branched annuals. Leaves narrower than the sheaths. Panicles numerous, dichotomously branched, often from each node and partially enclosed in the spathe-like sheaths. Spikelets hermaphrodite, laterally compressed, on stout 3-angled pedicels. Glumes unequal, 1-nerved. Lemmas 3-nerved. Stamens 3; lodicules 2.

1. *C. maritima* (L.) Benth.

Sclerochloa maritima (L.) Sweet

Cutandia Grass

Annual 10-40 cm. high. Culms caespitose or solitary, erect, prostrate or geniculate ascending; nodes 2-3; dark. Leaves up to 10 cm. x 3 mm., flat to involute, linear-lanceolate; ligule up to 3 mm. long, membranous, obtuse; sheaths with overlapping hyaline margins, more or less inflated, often partially enclosing the inflorescence, green to purplish, pale and shining. Panicle 2-10 x 1.5-5 cm., first contracted finally spreading to deflexed; branches triangular in section, stout, rigid; pedicels 0-3 mm. long. Spikelets 8-12 mm. long, 5- to 7-flowered, narrowly ovate, compressed. Glumes unequal, the upper 7-9 mm. long, lanceolate, acute, the lower 5-7 mm. long more or less setaceous, keeled. Lemmas 4-5 mm. long, ovate, acute, more or less keeled, shining. Anthers c. 2 mm. long. Fl. 3-5.

Sandy places near the sea. *Malta*: rare at Mellieha (Borg). *Gozo*: Ramla (Borg).

Mediterranean region.

7. *Desmazeria* Dumort.

Annuals. Leaves flat, folded or convolute. Inflorescence a unilateral spike. Spikelets sessile, laterally compressed. Glumes subequal, ovate-lanceolate, strongly keeled in the upper 3. Lemma broadly ovate, strongly keeled. Stamens 2; lodicules 2.

1. *D. sicula* (Jacq.) Dumort.

Catapodium siculum (Jacq.) Link

Sicilian Fescue

Annual 3-30 cm. high. Culms solitary or caespitose. Leaves up to 7 cm. x 3 mm., flat or folded, linear-lanceolate, glaucous, glabrous, strongly veined; ligule up to 1.5 mm. long, membranous; sheaths laxly imbricate. Inflorescence unilateral, 1-4 cm. long; rachis glabrous, terete below, flexuous and ridged adjacent to the spikelets. Spikelets 4-14 mm. long, ovate, 7- to 23-flowered. Glumes 2-4 mm. long, ovate-lanceolate with hyaline margins, shortly mucronate. Lemmas 3-4 mm. long, broadly ovate, acute or mucronate, strongly keeled, chartaceous, with shining hyaline margins, glabrous to pubescent on keel. Anthers 1.3-2 mm. long. Fl. 4-5.

Rocky and sandy places near the sea. *Malta*: rare (G. Lanfranco); Mellieha, Marfa, Marsaskuna (Borg); Bir Mochtab near Ghaxaq (Wolseley). *Gozo*: Ta' Cenc, Wied Bingemma, Ghajnsielem, Marsalforn, Ramla, Qala (Borg); Dwejra (Borg; Wolseley). *Comino* and *Cominotto*: (Borg).

W. Mediterranean region.

8. *Dactylis* L.

Perennials. Leaves flat. Panicle effuse or dense, the lower branches usually long. Spikelets 2- to 5-flowered, laterally compressed, bisexual, shortly pedicelled, in crowded fascicles. Glumes persistent, unequal, narrow, keeled, ciliate on the keels. Lemma 5-nerved, keeled, ciliate on the keel, mucronate at the apex. Stamens 3.

1. *D. glomerata* L. subsp. *hispanica* (Roth) Nyman

Plate LIX Dekkuka

D. hispanica Roth

Cock's-foot

Perennial up to 1 m. high, caespitose, with compressed vegetative shoots. Culms erect or spreading, scabrid or smooth, with 3-5 nodes. Leaves 10-45 cm. x 2-14 mm., linear, acute, scabrid, at first folded, opening flat; ligules 2-12 mm. long, jagged. Panicle 20-30 mm. long, unilateral, erect with branches close together and spike-like or lower usually distant; branches up to 18 cm. long, erect, effuse or sometimes deflexed, scabrid. Spikelets 5-9 mm. long, subsessile, in dense unilateral clusters, 2- to 5-flowered. Glumes persistent, acuminate, 1-3-veined; scabrid or hairy on keel. Lemmas exceeding glumes, 5-veined, keels ciliate or scabrid, tipped with rigid awn up to 1.5 mm. long. Anthers 3-4 mm. long. $2n = 28$. Fl. 4-6.

In valleys and uncultivated places; also maritime places. *Malta*, *Gozo* and *Comino*: locally frequent (S. & C.G.; Borg; G. Lanfranco; Haslam; Wolseley).

Mediterranean region; Asia; N. Africa; Canaries; introduced widely elsewhere.

D. marina Barrill (*Jour. Linn. Soc. Lond. (Bot.)* 56: 437 (1961) which is widespread in the Mediterranean region should be looked for in *Malta*. It differs from *D. glomerata* by having awns often branching, bearing secondary heads at the basal nodes (especially in autumn), leaves glaucous, and sheaths of upper leaves more or less inflated.

9. *Echinaria* Desf.

Annuals. Leaves flat, folded or convolute, scabrid, linear, acute. Inflorescence dense, terminal, globular or ovoid, prickly. Spikelets 3- to 4-flowered, on short scabrid pedicels; florets hermaphrodite or the upper reduced. Glumes more or less

equal in length, the lower with 2 veins terminating in mucros, the upper emarginate with median vein terminating in a mucro. Lemma broadly elliptical, scabrid, 5- to 7-nerved, terminating as strong, flattened, scabrid awns, reflexed at maturity. Stamens 3.

1. *E. capitata* (L.) Desf.

Plate IIX

Hedgehog Grass

Annual 5-25 cm. high. Culms solitary or fascicled, erect, rigid. Leaves narrow strongly veined, erect, folded or involute. Capitula dense, globular-ovate, becoming a prickly sphere at maturity with the pungent apices of the lemmas recurved. Anthers c. 1 mm. long. Fl. 3-5.

Rocky places. Gozo; rare at Wied ir-Rihan (S. & C.G.; Borg).

Mediterranean region; C. & W. Asia.

10. *Festuca* L.

Tufted perennials with erect culms. Leaves flat, folded or involute, sometimes auricled at base; sheaths split to the base or more or less tubular. Panicle dense to effuse, with patent branches. Spikelets several-flowered, hermaphrodite. Glumes subequal, narrow subulate. Lemmas dorsally rounded, 5-veined, awned or awnless. Stamens 3.

1. Leaves setaceous, inrolled, 0.5-1 mm. wide
Leaves flat, 3-12 mm. wide

1. *longifolia*

2. Auricles of the sheaths shortly ciliate on the margins; lemmas short awned
Auricles of the sheaths glabrous on the margins; lemmas awnless

2. *fenas*

3. *pratensis*

1. *F. longifolia* Thuill.

F. ovina var. *duriuscula* L.

Hard Fescue

Perennial 15-70 cm. high, without rhizomes. Culms erect or geniculately ascending, with 1-2 nodes. Leaves 5-30 cm. x 0.5-1 mm., setaceous, closely involute, scabrid to smooth; ligules reduced. Panicle 2-12 cm. long, effuse or becoming contracted, erect, unilateral; axis and branches angular, scabrid; pedicels 1-4 mm. long. Spikelets 6-10 mm. long, 4- to 9-flowered, oblong or elliptical. Glumes persistent, slightly unequal, acute, upper 3-veined, lower 1-veined. Lemmas dorsally rounded; awn up to 4 mm. long, terminal, scabrid. Anthers 2.3 mm. long. Fl. 4-5.

Arid places. Malta; rare at Kordin (Delicata; Borg).

Europe; C. & N. Asia, N. Africa; introduced in N. America.

2. *F. fenas* Lag.

Plate LX

Zwien

F. elatior var. *arundinacea* Schreber

Perennial 50-100 cm. high, laxly caespitose. Culms erect or geniculately ascending, unbranched, glabrous, terete, with 1-3 nodes. Leaves up to 20 cm. x 5 mm., linear-lanceolate, flat or involute, glaucous, glabrous; ligule up to 2 mm. long, membranous; auricles spreading. Panicles 10-30 cm. long, erect, contracted and narrow, often interrupted; axis and branches angular, scabrid; branches arising

in pairs, one very short, one up to 5 cm. long, each bearing 3-many spikelets; pedicels up to 6 mm. long, usually shorter. Spikelets 5-9 mm. long (excluding awns), 3- to 5-flowered, elliptical. Glumes persistent, unequal, lanceolate, acute, with hyaline margins, the lower c. 4 mm. long, 1-veined, the upper c. 5 mm. long, 3-veined. Lemmas 4-5 mm. long, membranous, 3-veined, lanceolate, acute, dorsally rounded, more or less scabrid; awn up to 3 mm. long, terminal. Anthers c. 2.5 mm. long. Fl. 3-6.

Along streams and in valleys. Malta and Gozo: frequent (S. & C.G.; Borg; G. Lantano; Wolseley); Dingli cliffs (Kramer & Westra).

Mediterranean region.

2. *F. pratensis* Hudson

Meadow Fescue
Zwien

Perennial 30-120 cm. high, laxly caespitose or forming tussocks. Culms, more or less erect, unbranched, smooth, with 2-4 nodes. Leaves up to 45 cm. x 3-8 mm., convergent to an acute acute apex, glossy below, scabrid on the margins and sometimes above; ligules c. 1 mm. long; auricles narrow, spreading, glabrous. Panicles 10-35 cm. long, effuse, more or less unilateral, axis and branches scabrid; branches angular, usually arising in unequal pairs each bearing 1-3 spikelets; pedicels up to 5 mm. long. Spikelets 10-20 mm. long, cylindrical, becoming oblong, 5- to 14-flowered. Glumes persistent, lanceolate, more or less unequal, the lower 1-veined, the upper 1-3-veined. Lemmas dorsally rounded, 5-veined, awnless. Anthers 3-4 mm. long. $2n = 14$. Fl. 3-6.

Rocky valleys. Malta: very rare at Wied Babu (G.D.; Borg).

Europe; Asia; introduced in N. America.

11. *Vulpia* C.C. Gmelin

Annuals. Leaves linear, folded, revolute or involute; sheaths not tubular. Panicle more or less spike-like, often a raceme of shortly pedicelled unilateral spikelets. Spikelets 3- to 9-flowered, usually hermaphrodite. Glumes persistent, unequal, linear, acuminate. Lemmas membranous, awned, margins involute at maturity. Stamens 1-3.

1. Lemmas with conspicuous ciliate margins
Lemmas without ciliate margins

1. *ciliata*

2. Glumes ovate-acute, the upper without awn or shortly awned, the lower minute, 0.2-1.6 mm. long
Glumes narrowly lanceolate, the upper terminated by an awn 4-10 mm. long, the lower 2-6 mm. long

4. *fasciculata*

3. Upper glume 3-veined; branches of panicles slightly spreading, more or less unilateral
Upper glume 1-veined; panicles narrow, branches appressed to the rachis

2. *bromoides*

3. *myuros*

1. *V. ciliata* Dumort.

Plate LX

Ciliate Fescue

Annual up to 40 cm. high. Culms caespitose or solitary, erect or geniculately ascending, smooth, entirely enclosed in the leaf-sheaths. Leaves 1-10 cm. long,

linear-lanceolate, folded. Panicle 1-16 cm. long, dense, unilateral, partially enclosed in the uppermost leaf-sheath; branches erect, appressed. Spikelets 6-10 mm. long (excluding awns), 2- to 7-flowered, with 1-4 sterile lemmas at the apex. Glumes very unequal; the lower minute, hyaline the upper 2-4 mm. long, oblong-ovate, obtuse, with broad hyaline margin, 3-7 mm. long (excluding awn). Lemmas narrowly lanceolate, long-ciliate on the margins, the fertile ciliate on the dorsal surface, the sterile shortly pubescent or glabrous; awn 8-20 mm. long, terminal, rough, straight. Anthers usually 1, c. 1 mm. long. Fl. 3-5.

Arid rocky places. *Malta*, *Gozo* and *Comino*: common (S. & C.G.; Borg; G. Lanfranco; Wolsley).

Mediterranean region; W & C. Asia.

2. *V. bromoides* (L.) S.F. Gray.
V. myuros var. *dertonensis* Gola

Squirrel-tail Fescue

Annual 5-60 cm. high. Culms caespitose or solitary, erect or geniculate ascending, smooth, with 2-4 nodes. Leaves 1-14 cm. x 0.5-3 mm., linear-lanceolate, acuminate, scabrid on the margins; ligules up to 0.5 mm. long. Panicle 1-10 cm. long. Panicle 1-10 cm. long, at maturity exerted from the uppermost sheath, dense, more or less erect, unilateral; branches erect or slightly spreading; pedicels 1-4 mm. long, thickened below spikelet. Spikelets 7-14 mm. long (excluding awns), 5- to 10-flowered. Glumes persistent, acute, the upper 6-10 mm. long, 3-veined, the lower 3-6 mm. long, 1-veined. Lemmas 5-9 mm. long, dorsally rounded, margins at first overlapping, finally involute, narrowed into a fine, rough awn up to 13 mm. long. Stamens usually 1; anthers 0.3-0.8 mm. long. $2n = 14$. Fl. 3-5.

In arid and exposed places. *Malta*: locally frequent (G. Lanfranco); as at Verdala, Buskett, Tal-Gholja, Hagar Qim, Wied Babu, Wied l-Zurried, Gargenti (Borg). *Gozo*: Xlendi, Ta' Cené, Munxar (Borg).

Europe; W. Asia; N. & S. Africa; N. America.

3. *V. myuros* (L.) C.C. Gmelin

Rat's-tail Fescue

Annual 10-45 cm. high. Culms caespitose or solitary, erect or geniculate ascending, smooth, entirely enclosed in the leaf-sheaths. Leaves linear-lanceolate, folded or convolute. Panicle 4-20 cm. long, more or less unilateral, spike-like, lax, with lower branches more or less nodding; branches short, erect, scabrid, with sheath; rachis erect or more or less nodding; branches short, erect, scabrid, with 1-6 spikelets; pedicels swollen below spikelet. Spikelets 7-10 mm. long (excluding awns), 3- to 7-flowered, with 2-4 sterile lemmas at the apex. Glumes obscurely veined, with broad hyaline margins, lanceolate, acute, the upper 4-8 mm. long, the lower 2-6 mm. long. Lemmas abruptly swollen at base, tough, dorsally rounded, obscurely veined, scabrid on the dorsal surface, lanceolate; awn 7-14 mm. long, terminal, straight. Anthers 0.3-0.6 mm. long. $2n = 14$. Fl. 3-5.

Stony, sheltered places. *Malta*: rare (G. Lanfranco); Gargenti (S. & C.G.; Borg); Hagar Qim, Wied Babu (S. & C.G.); Ghajn il-Kbira, Buskett (Borg). *Gozo*: Xlendi (S. & C.G.).

C. & S. Europe; Asia to Himalaya; N. Africa; Macaronesia; probably introduced in S. Africa, N. & S. America, Australia.

4. *V. fasciculata* (Forsk.) Samp.
V. memoranacea auct.

Dune Fescue

Annual 10-60 cm. high. Culms caespitose or solitary, erect or spreading, smooth, with 2-3 nodes. Leaves 1-10 cm. x up to 3 mm., involute or open, smooth. Panicles 2-12 cm. long, unilateral, branched in the lower part, or a raceme-like spike; pedicels 3-7 mm. long, erect, scabrid. Spikelets 12-16 mm. long (excluding the awns), 2- to 3-flowered, with 3-4 sterile lemmas at the apex. Glumes very unequal, the lower 0.2-1.6 mm. long, the upper 10-14 mm. long, narrowly lanceolate, awn 4-6 mm. long, terminal, scabrid with hyaline margin. Fertile lemmas 8-16 mm. long, narrowed at apex; awn up to 25 mm. long, terminal, straight, scabrid. Sterile lemmas smaller and narrower than fertile. Stamens 1-3; anthers 0.5-1.5 mm. long. $2n = 14, 42$. Fl. 4-5.

Arid places, often coastal. *Malta*: locally frequent (G. Lanfranco), Kordin, Marfa (S. & C.G.; Borg); Wied Inčita, Zabbar, Ghajn Tuffieha, Mellieha (Borg). *Gozo*: Ta' Cené (S. & C.G.; Borg); Qala (Borg). *Comino*: common everywhere (S. & C.G.; Borg).

Mediterranean region to W. Europe.

12. *Lolium* L.

Annuals or perennials. Leaves flat, auricled at base. Inflorescence a simple, terminal raceme (spike). Spikelets 3- to 20-flowered, sessile, more or less compressed, distichous and alternate at the nodes in the cavities of a more or less rough rachis. Glumes of the terminal spikelet equal, but in lateral spikelets lower glume suppressed. Lemmas overlapping, awned or awnless. Stamens 3.

- | | | |
|---|-----------------------|----|
| 1. Lemma elliptical to ovate, turgid at maturity | 4. <i>temulentum</i> | 2. |
| Lemma oblong-lanceolate, not turgid at maturity | | |
| 2. Glumes at least $\frac{1}{2}$ as long as spikelet and often concealing the florets | 3. <i>rigidum</i> | 3. |
| Glumes about $\frac{1}{2}$ as long as spikelet | | |
| 4. Perennial; spikelet 2- to 10-flowered; lemma usually awnless | 1. <i>perenne</i> | |
| Annual to biennial; spikelet (9-)11. to 23-flowered; lemma usually awned | 2. <i>multiflorum</i> | |
| 1. <i>L. perenne</i> L. | Sikrana | |
| | Perennial Rye-grass | |

Perennial 10-90 cm. high, tufted. Culms smooth, with 2-4 nodes. Leaves (5-)14-30 cm. x 2-4 mm., linear-lanceolate, acute or obtuse, folded when young, smooth and shiny below, smooth to more or less scabrid above; auricles inconspicuous or absent; ligule up to 2.5 mm. long, obtuse. Spike 3-31 cm. long, compressed, straight or slightly curved. Spikelets 5-23 mm. long, oblong to elliptical, 2- to 10-flowered. Upper glumes persistent, $\frac{1}{2}$ as long as to slightly longer than the spikelet, lanceolate, obtuse, dorsally rounded, smooth. Lemmas obtuse to acute, dorsally rounded, awnless. Anthers 3-4 mm. long. $2n = 14, 28$. Fl. 4-6.

Waste and cultivated places. *Malta* and *Gozo*: frequent among crops (S. & C.G.; G. Lanfranco; Wolsley).

Europe, except the Arctic; temperate Asia; N. Africa; widely introduced elsewhere.

2. *L. multiflorum* Lam.
L. perenne var. *multiflorum* (Lam.) Parn.

Italian or Annual Rye-grass

Annual or biennial 30-130 cm. high. Culms solitary or fasciculate, smooth or scabrid towards the spike, glabrous, with 4-5 nodes. Leaves 11-22 cm. x 3-8 mm., linear, acuminate, glabrous and shiny beneath, usually more or less scabrid above, convolute in young shoots; auricles narrow, spreading; ligules 1-4 mm. long, obtuse. Spike 15-33 (-45) cm. long, compressed, erect or nodding, rachis slender, flexuous, more or less scabrid. Spikelets 15-33 (-45) cm. long, oblong, awned, (9-)11- to 23-flowered. Glumes narrowly lanceolate to narrowly oblong, $\frac{1}{2}$ - $\frac{3}{4}$ as long as the spikelet. Lemmas obtuse or minutely 2-toothed, dorsally rounded; awn up to 15 mm. long, more or less arising from the apex. Anthers 3-4.5 mm. long. $2n = 14$. Fl. 4-6.

Waste places. *Malta*: Marfa and probably elsewhere (Borg).

Perhaps native in S. Europe; widely cultivated and often naturalised in Temperate regions.

3. *L. rigidum* Gaudin

Plate LX

Sikrana
Stiff Rye-grass

Annual (6-)18-45(-70) cm. high. Culms caespitose or solitary, with 2-4 nodes. Leaves up to 17 cm. x 8 mm., acute to obtuse, glabrous beneath, glabrous or scabridulous above; ligule up to 1.5 mm. long; auricles inconspicuous or absent. Spike 3-30 cm. long; rachis usually somewhat rigid, slender to very thick, glabrous to scabrid. Spikelets 5-8 x 1.3(-7) mm., (2-) 5- to 8(-11)-flowered, often partly or completely concealed by the glumes in the cavities of the rachis. Glumes lanceolate-oblong, obtuse, $\frac{1}{2}$ - $\frac{3}{4}$ as long as to slightly longer than the spikelet. Lemma usually awnless, rarely with a subterminal awn up to 10 mm. long. $2n = 14$. Fl. 4-6.

Two subsp. occur. Subsp. *rigidum* has the axis (0.5-)1.0 - 1.5 (-2.0) mm. in diameter at the lowest nodes of the inflorescence; glumes herbaceous to somewhat indurate; lemma 4.5-8.5 mm. long. Subsp. *lepturoides* (Boiss.) Sennen and Marricó, Cat. Fl. Rif Orient. 135(1935) has a rachis 1.5-3.5 mm. in diameter at the lowest nodes of the inflorescence; glumes indurate; lemma 3.2-5.5(-7) mm. long.

Cultivated and waste places. *Malta*, *Gozo* and *Comino*: very common everywhere (S. & C.G.; Borg; E. & G. Lanfranco; Wolseley).

Mediterranean region to S.C. Europe; W. & C. Asia; introduced in Australia and N. & S. America.

4. *L. temulentum* L.

Sikrana
Darnel

Annual 20-120 cm. high, solitary or fasciculate. Culms smooth or more or less scabrid towards spike, with 3-5 nodes. Leaves 27 cm. x 1-12 mm., linear-lanceolate, acuminate, stiff, usually scabrid, auricles narrow and spreading or absent; ligule up to 2.7 mm. long, obtuse. Spike 5-40 x 5-12 mm. long, rigid, axis stout. Spikelets 8-28 x 3-8 mm., turgid, 2- to 15-flowered. Glumes $\frac{1}{2}$ - $1\frac{1}{2}$ times as long as the spikelet, lanceolate, obtuse, rigid. Lemmas elliptical to ovate, obtuse, dorsally rounded, becoming indurate, awns usually present, subterminal, straight, up to 23 mm. long. Anthers 2.5 mm. long. $2n = 14$. Fl. 4-5.

Among growing crops. *Malta* and *Gozo*: frequent (S. & C.G.; Borg; Wolseley). Europe except the north; N. Africa; temperate Asia; introduced in N. & S. America, S. Africa and Australia.

13. *Sphenopus* Trin.

Annuals. Inflorescence a panicle. Spikelets 2- to 7-flowered, laterally compressed; pedicels clavate. Glumes persistent, markedly unequal, nerveless, chartaceous. Lemmas membranous, 3-veined. Paleas 2-keeled, 2-lobed. Stamens 3.

1. *S. divaricatus* (Gouan) Reichenb. Plate LX Coastal Grass

Annual 6-30 cm. high. Culms caespitose, erect or geniculate at base, slender, smooth, glabrous; nodes 1-3, dark; ligule 3-6 mm. long, dentate at the apex. Leaves 1-5 cm. x 1-2 mm., lanceolate, folded or involute, hooded at the apex. Panicle up to 6 x 4 cm., compact when young, finally effuse, branched in pairs at each node of the axis, slender, smooth, di- or trichotomously divided, ultimate branches with pedicels clavate. Spikelets 1.5-4 mm. long. Glumes ovate, 2-lobed at apex, the lower 0.5-1 mm. long, the upper 1-2 mm. long. Lemmas ovate, acute, keeled above, 3-veined. Anthers 2-3 mm. long. Fl. 3-5.

Coastal areas inundated by the sea in winter. *Malta*: local (G. Lanfranco); Ta' Baldu, Marsa, St. Paul's Bay, Hamrun, Floriana, Kordin, Għerenti (S. & C.G.; Borg); Għira gardens, Sliema, Msida; Salini, Gnejna (Borg). *Gozo*: Ramla, Mgarr (S. & C.G.; Borg); Marsalforn (Borg).

S. Europe; N. Africa; Macaronesia; W. & C. Asia; introduced elsewhere.

14. *Lamarckia* Moench

Annuals. Leaves flat. Panicle spike-like, unilateral. Spikelets long-pedicelled, in two parts, the lower fertile, the upper sterile. Lemmas of fertile florets bifid and long-awned from the sinus, sterile florets without awns.

1. *L. aurea* (L.) Moench Plate LX Golden Grass

Annual 5-30 cm. high. Culms solitary or caespitose, erect or geniculately ascending, leafy, with 1-4 nodes. Leaves 2-15 cm. x 3-8 mm., flat, bright, green; broadly lanceolate, minutely hairy; ligule 5-12 mm. long, ovate, acute, extended as a membranous margin to the inflated leaf sheath. Spike 2-6 x 1-2 cm., unilateral, ovoid-oblong, frequently partly enclosed in the uppermost leaf-sheath, golden-green to golden-yellow, shining; branches articulated below pedicels; pedicels white hairy. Spikelets in two parts, the lower part 3-4 mm. long with 1 fertile and 1 sterile floret each with long awns, the upper 5-13 mm. long with 5-11 sterile awnless florets. Glumes 3-5 mm. long, more or less equal, lanceolate, strongly 1-veined, dorsally hairy. Lemmas of fertile floret 3-4 mm. long, ovate, with bifid apex, long-awned from the sinus; lemmas of sterile spikelets 1-2 mm. long, ovate, obtuse. Anthers c. 0.5 mm. long. Fl. 3-5.

Disturbed and waste places. *Malta*: frequent (G. Lanfranco; Valletta, Mosta, St. Paul's Bay, Salini, Mgarr, Gnejna (Borg); Floriana (Borg; Sell); Wied il-Għasel (Borg; Wolseley).

Mediterranean region; W. Asia; Macaronesia; introduced in N. America.

15. *Poa* L.

Annuals or perennials. Leaves flat, hooded at the apex. Panicle effuse or contracted. Spikelets compressed, flowers few to many, arranged distichously on the joints of a fragile rachilla, hermaphrodite, with the upper rudimentary or occasionally female. Glumes more or less unequal, the lower 1-veined, the upper 3-veined. Lemmas keeled, 5-veined, hyaline at the apex and on the margins. Stamens 3.

- | | |
|--|---------------------------------------|
| 1. Basal leaf-sheaths enlarged and fleshy, forming a bulbous thickening
Basal leaf-sheaths thin | 2. <i>bulbosa</i> |
| 2. Perennials 20-100 cm. high; branches of panicle in whorls of 3-7
Annuals 3-30 cm. high; branches of panicle solitary or in pairs | 1. <i>trivialis</i> |
| 3. Anthers 0.7-1.3 mm. long; lemma over 2.5 mm. long
Anthers 0.2-0.5 mm. long; lemma under 2.5 mm. long | 3. <i>annua</i>
4. <i>infirmis</i> |

1. *P. trivialis* L.

Perennial 20-100 cm. high, with creeping leafy stolons. Culms erect, smooth, with 3-5 nodes. Leaves 3-20 cm. x 5-6 mm., linear-lanceolate, folded at first; sheaths more or less scabrid, keeled; ligules 4-10 mm. long, acute. Panicle 3-20 x up to 15 cm., effuse or more or less contracted; branches in clusters of 3-7, spreading; pedicels 0.3-2 mm. long. Spikelets 3-4 mm. long, 2- to 4-flowered. Glumes persistent, subequal, acuminate, keels scabrid, the lower lanceolate, the upper ovate. Lemmas acuminate, keeled, with short hairs on the keel, long-hairy at the base. Anthers 1.5-2 mm. long. $2n = 14$. Fl. 3-5.

Damp places in the valleys. *Malta*: local (G. Lanfranco); Għgant, Mtahleb, San Martin (S. & C.G.; Borg); Għajn Hstas, Buskett (Borg). *Gozo*: Wied Qorrot (S. & C.G.; Borg); Wied il-Lunzjata (Borg).

Bulbous Meadow-grass

2. *P. bulbosa* L.

Perennial 5-35 cm. high. Culms caespitose, swollen, more or less bulbous at the base, smooth, with 2-4 nodes. Leaves 10-11 cm. x 1-2 mm., folded or more or less flat, smooth, scabrid on the margins; ligule up to 4 mm. long, acute. Panicle 2-6 x 1.2-3 cm., ovate or oblong, contracted and more or less dense; branches ascending, scabrid. Pedicels 0.3-3 mm. long. Spikelets 3-5 mm. long, compressed, 3- to 6-flowered. Glumes persistent, equal, keeled, acuminate, scabrid on the keels with broad membranous margins, the lower ovate, the upper broader. Lemmas lanceolate, keeled, shortly hairy on keel and marginal nerves and long hairy at the base. Anthers 1-1.5 mm. long. $2n = 28, 35, 45$. Fl. 4-6.

Arid rocky places and roadsides. *Malta* and *Gozo*: frequent in many places (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Europe, mainly in the south and west, north to S. Scandinavia; temperate Asia, N. Africa; introduced in N. America.

3. *P. annua* L.

Plate LX

Mellieħ

Annual Meadow-grass

Annual or short-lived perennial, 3-30 cm. high. Culms more or less unbranched, erect or geniculate ascending, with 2-4 nodes. Leaves 1-14 cm. x 1.5 mm., linear, abruptly acute; sheaths compressed, keeled; ligules 2-5 mm. long. Panicle 1-12 cm. long, effuse or more or less contracted; branches in pairs or solitary, spreading; pedicels 0.3-4 mm. long. Spikelets 3-10 mm. long, 3- to 10-flowered. Glumes persistent, keeled, unequal, acute. Lemmas overlapping, elliptical, obtuse, with broad hyaline margins, silky hairy on the lateral nerves and keel. Anthers 0.7-1.3 mm. long. $2n = 28$. Fl. 12-6.

Waste land, paths and roadsides. *Malta*, *Gozo* and *Comino*: common everywhere (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Throughout nearly the whole world, but mainly on mountains in the tropics.

4. *P. infirma* Kunth

Early Meadow-grass

Annual up to 30 cm. high. Culms caespitose, erect, smooth and glabrous, slender, with 1-3 nodes. Leaves 0.5-8 cm. long x 1-4 mm. wide, folded or flat, dense, glabrous; ligule up to 3 mm. long; sheaths keeled, glabrous. Panicle effuse; branches in pairs or solitary; pedicels 0.3-3 mm. long. Spikelets 2-4 mm. long, 2- to 4-flowered. Glumes unequal, persistent, the lower ovate, 1-veined, the upper elliptic-oblong, 1- to 3-veined. Lemmas keeled, membranous, 5-veined, densely hairy on veins. Anthers 0.2-0.5 mm. long. $2n = 14$.

Waste places and disturbed ground. *Malta*: Mellieħa (Kramer & Westra).

Mediterranean region to S.W. Europe and C. Asia; introduced in S. America.

16. *Puccinellia* Parl.

Tufted or creeping annuals or perennials. Panicle compound, of many subterete spikelets. Glumes unequal, shorter than first floret, membranous, with hyaline margins, 1- to 3-nerved, bluntly keeled. Lemmas membranous, with hyaline apex, oblong or ovate, obtuse, 5-nerved, nerves stopping short of apex or central one shortly excurrent. Stamens 3.

5. *P. fasciculata* (Torrey) Bicknell

Plate LIX

Borrer's Saltmarsh-grass

Glyceria distans var. *borreri* Bab.

Perennial 6-60 cm. high, loosely to densely tufted. Culms unbranched, smooth, with 1-3 nodes. Leaves 20-160 cm. x 1.5-5 mm., narrow, with more or less obtuse apex, flat or folded, scabrid above, smooth beneath; ligule 1-2.5 mm. long, obtuse. Panicle 2.5-18 cm. long, lanceolate to narrowly oblong or ovate, contracted and dense or lax and open, more or less unilateral; branches stiff, scabrid, crowded with spikelets to the base. Spikelets 4-6 mm. long, 3- to 8-flowered. Glumes persistent, ovate to elliptical, obtuse, with white membranous margins and apex, the lower smaller than upper. Lemmas exceeding glumes, overlapping, elliptical, dense, central nerve excurrent. Anthers 0.6-1 mm. long. $2n = 28$. Fl. 4-6.

Saline flooded areas and damp valleys. *Malta*: locally frequent (G. Lanfranco); Marsa (S. & C.G.; Borg; E. Lanfranco; Wolseley); Mtahleb, Għgant, Għajn il-Kbir, Għajr-Ġerzuma (S. & C.G.; Borg); Għnejna (Borg; G. Lanfranco; Wolseley); Bahrija (Borg).

Mediterranean region and W. Europe north to Sweden; S. Africa; N. America.

Tribe *Glyceriace* Endl. Annual or perennial grasses, mainly aquatic. Leaves flat, linear; sheaths tubular; silica bodies oblong with sinuate outline; ligule scarious or membranous. Inflorescence a narrow or ovate, simple or compound panicle. Spikelets all alike, pedicelled, terete or laterally compressed, few to many-flowered, hermaphrodite, rachis disarticulating above the glumes and between the florets. Glumes persistent, unequal, 1- to 3-veined; lemmas 7- to 9-veined, glabrous, usually hyaline at the apex; paleas 2-keeled, strongly convex adaxially; stamens 3; style 2, stigmas plumose. Chromosomes small; base number 10.

17. *Glyceria* R. Br.

The characters of the genus are those of the tribe, which is monotypic.

1. *G. plicata* Fries Plate LX Plicate Sweet-grass
G. fluitans R.Br. var. *plicata* (Fries) Fiori

Perennial 30-80 cm. high. Culms geniculate at base, rooting at the nodes, spongy, smooth. Leaves 5-30 x 3.14 mm., acute, folded or flat, scabrid on both sides or more or less smooth above; ligule 2-8 mm. long, more or less jagged. Panicle 10-45 cm. long, effuse; branches finally widely spreading, the lower in clusters of 2-5 with one branch longer, up to 12 cm.; pedicels 1-6 mm. long. Spikelets 10-2 x 1.5-2 mm., at first cylindrical, finally more or less compressed, 7- to 16-flowered. Glumes persistent, oblong to broadly elliptical, truncate, the upper longer than the lower. Lemmas dorsally rounded, broad, obtuse, more or less 3-lobed, 7-veined, scabrid. Anthers 1-1.5 mm. long. $2n = 40$. Fl. 4-5.

Along streams and pools in valleys. *Malta*: occasional at Ghajn Mula (S. & C.G. Borg); Mtahleb (S. & C.G. Borg; Wolseley); Wied Bufula (Borg); Ghajn Rihana (Borg; Wolseley); Buskett (Haslam); Bahrija (Wolseley).

Europe to c. 60° N. in Scandinavia; W. & C. Asia; N. Africa.

Tribe *Bromeae* Dumort. Annuals or perennials. Leaves flat, linear, acuminate, sheaths tubular, soon splitting; silica bodies oblong; ligules membranous. Inflorescence a panicle, lax or dense. Spikelets all similar, terete or laterally compressed, several to many-flowered, hermaphrodite; axis disarticulating above the glumes and below each floret. Glumes unequal, the lower 1- to 3-veined; the upper 3- to 7(-9) veined, lemmas 5- to 11-veined, 2-cleft or lobed at the hyaline apex, awnless or with 1, 3, 7 or 9 straight or recurved awns; paleas hyaline, 2-keeled; stamens 3 or 2; styles 2, stigmas pilose. Chromosomes large; base number 7.

18. *Bromus* L.

Annuals or perennial. Leaves flat. Inflorescence a panicle, contracted and erect or effuse and nodding. Spikelets cuneate, several-flowered, hermaphrodite. Glumes persistent, subulate or lanceolate, the lower 1- to 3-veined, the upper 3- to 4-veined. Lemmas 5- to 11-veined, bifid at apex; awns to 1-3, arising from below apex, or awnless and mucous. Stamens (2-) 3.

1. Spikelets oblong or cuneate, gaping; lower glume 1-veined, upper 3-veined
 Spikelets ovate, elliptical or oblong, narrowed towards apex; lower glume 3- to 7-veined, upper 5- to 9-veined

2. Spikelets 70-90 mm. long (including awns)
 Spikelets not more than 60 mm. long (including awns)
 3. Panicle effuse, nodding; branches up to 10 cm. long
 Panicle spike-like, erect; branches up to 2 cm. long
 4. Awns and lemmas curved outwards
 Awns and lemmas straight
 5. Panicle effuse, nodding
 Panicle spike-like, contracted, erect
 6. Lemmas glabrous; culms glabrous below the panicle
 Lemmas long hairy or finely pubescent; culms densely pubescent below the panicle
 7. Panicle effuse; branches up to 8 cm. long; spikelets with pedicels up to 3 cm. long
 Panicle more or less spike-like; branches short; spikelets subsessile
 8. Spikelets ovate-lanceolate; lemmas 1-2.5 mm. wide, lanceolate
 Spikelets ovate; lemmas 4-5 mm. wide, broadly ovate
 9. Lemmas glabrous, scabrid
 Lemmas densely and softly hairy
 10. Lemmas 7-8 mm. long
 Lemmas 8-11 mm. long

1. *B. diandrus* Roth
B. villosus var. *maximus* Desf.
 Bunexxief
 Great Brome

Annual 35-80 cm. high. Culms caespitose or solitary, erect or spreading, with 3-6 nodes. Leaves 10-25 x 0.4-0.8 cm., lanceolate, finely acute, sparsely hairy, scabrid; ligule 3-6 mm. long, lacinate. Panicle up to 25 cm. long, effuse, pendulous, green or purplish; branches up to 10 cm. long, spreading, scabrid, bearing 1-2 spikelets. Spikelets 7-9 cm. long (including awns), laxly 5- to 8-flowered, cuneate, gaping. Glumes unequal, the lower 15-23 mm. long, subulate, the upper 20-32 mm. long, narrowly lanceolate. Lemmas 23-36 mm. long, narrowly lanceolate, dorsally rounded and keeled, scabrid, bifid at the apex; awn arising from the sinus, 3.5-6 cm. long, straight, stout, scabrid. Anthers 2-3, 0.8-1.5 mm. long. $2n = 56$. Fl. 1-5.

Cultivated and waste places. *Malta*, *Gozo* and *Comino*: common everywhere (S. & C.G. Borg; G. Lanfranco; Haslam; Wolseley).

Mediterranean region; introduced further north in W. Europe and elsewhere.

2. *B. rigidus* Roth
 Rigput Brome

Annual 8-55 cm. high. Culms solitary or caespitose, erect or geniculately ascending, smooth, pubescent near panicle, with 1-3 nodes. Leaves 2-8 x 0.2-0.4 cm., broadly lanceolate, flat, softly hairy; ligule up to 3 mm. long, lacinate. Panicle more or less spike-like, rigid, green to purple, with erect branches 2-20 mm. long. Spikelets 6-9 mm. long (including awns), 5- to 13-flowered, ovate, softly hairy. Glumes

unequal, lanceolate, with hyaline margins, shining, the lower 1.2 cm. long, the upper up to 2.3 cm. long. Lemma up to 1.2-1.8 cm. long (excluding awn), dorsally rounded, ovate-lanceolate, with hyaline margins, deeply bifid at apex; awn arising from the sinus, 4.5 cm. long, scabrid, straight. Anthers 1.5-2.0 mm. long. $2n = 42$. Fl. 2-4.

Waste places. *Malta*, *Gozo* and *Comino*: frequent (Borg; G. Lanfranco).

S. & W. Europe; N. Africa.

3. *Bromus madritensis* L.

B. sterilis var. *madritensis* (L.) Fiori

Bunexxief

Compact Brome

Annual 14-65 cm. high. Culms solitary or caespitose, erect or geniculately ascending, smooth below, sometimes pubescent above, with 2-4 nodes. Leaves 2-20 x 0.2-0.5 cm., lanceolate, acuminate, folded or flat, sparsely hairy or glabrous. Panicle 2-15 x 0.75-5 cm. (excluding awns), interrupted, erect or slightly nodding; branches 0.5-3.5 cm. long; pedicels (2-) 0-14 mm. long. Spikelets 1.5-5 cm. long (excluding awns), dense but not compact, 6- to 13-flowered, cuneate, gaping, green to purple. Glumes unequal, lanceolate, the lower 6-11 mm. long, subulate, 1-veined, the upper 10-16 mm. long, linear-lanceolate, 3-veined. Lemmas 12-19 mm. long, linear-lanceolate, dorsally rounded, with shining membranous margins, bifid at the apex; awn arising from the sinus, 12-18 mm. long, scabrid. Anthers 0.5-1 mm. long. $2n = 42$. Fl. 1-5.

Cultivated and waste places and valleys. *Malta*, *Gozo* and *Comino*: common everywhere (S. & C.G.; Borg; E. & G. Lanfranco; Wolseley).

W. Europe to c. 51° N.; Mediterranean region; W. Asia; Macaronesia; introduced in N. & S. America and Australia.

4. *B. rubens* L.

Bunexxief

Red Brome

Annual 10-45 cm. high. Culms solitary or caespitose, erect or geniculately ascending, smooth, pubescent below the panicle, with 1-3 nodes. Leaves 1.5-10 x 0.15-0.4 cm., lanceolate, acuminate, folded or flat, softly pubescent; ligule up to 2 mm. long. Panicle 3-7 x 1-3 cm. (excluding awns), erect, green to purple, dense with short branches. Spikelets 1.5-3.5 cm. long (excluding awns), subsessile, cuneate. Glumes unequal, lanceolate, acute. Lemmas 10-15 mm. long (excluding awns), lanceolate, rounded dorsally, finely pubescent to long hairy, with scarious margin and a deeply bifid tip; awn arising from the sinus, 1.5-2.5 cm. long, scabrid, straight. Anthers 0.6-1 mm. long. Fl. 2-4.

Arid rocky places. *Malta* and *Gozo*: rare at Kordin (GD.); Buskett, Ta' Brijja, D. Gholja, Dingli (Borg).

Mediterranean region; W. & C. Asia; Macaronesia; introduced in N. America.

5. *B. fasciculatus* C. Presl.

B. rubens var. *fasciculatus* (C. Presl) Fiori

Mediterranean Brome

Annual 4-30 cm. high. Culms solitary or caespitose, erect or geniculately ascending, with 1-3 nodes. Leaves 2-12 x 0.10-0.3 cm., linear, obtuse, convolute, setaceous, folded, or flat, softly hairy; ligule up to 1 mm. long or absent. Panicle 1.5-7 x 0.6-2 cm. (excluding awns), dense, spike-like, erect, cuneate at the base.

Branches short, up to 3 mm. long, shortly pilose, spikelets subsessile. Spikelets 1.8 cm. long (excluding awns), 4- to 9-flowered, gaping. Glumes unequal, lanceolate, acute. Lemmas awl-shaped, recurved, with involute scarious margins, bifid at the tip; awn arising from the sinus, up to 1.5 cm. long, scabrid, recurved. Anthers 0.3-0.4 mm. long. Fl. 2-4.

Arid, rocky places in exposed areas. *Malta*, *Gozo* and *Comino*: common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region.

6. *B. tectorum* L.

Drooping Brome

Annual 10-60 cm. high. Culms solitary or caespitose, erect or geniculately ascending, smooth, slender, with 1-5 nodes. Leaves 1.5-20 x 0.15-0.5 cm., lanceolate, flat, softly hairy; ligule up to 5 mm. long, laciniate. Panicle 4-18 cm. long, lax, pendulous, unilateral, green or purplish, shining; branches up to 5 cm. long, filiform, clustered, slender, flexuous. Spikelets 2.5-3.5 cm. long (including awns), 1- to 8-flowered, cuneate, finally gaping. Glumes unequal, lanceolate, the upper 7-17 mm. long, the lower 5-8 mm. long. Lemmas 9-13 mm. long, linear-lanceolate, dorsally rounded, with hyaline margins extended to deeply bifid apex; awn arising from the sinus, 10-18 mm. long, scabrid, straight. Anthers 0.5-1 mm. long. $2n = 42$. Fl. 3-5.

Cultivated and waste places by roads. *Malta*, *Gozo* and *Comino*: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Native of Mediterranean region; widely introduced elsewhere in Europe and other parts of the world.

7. *B. racemosus* L.

B. hordeaceus var. *racemosus* (L.) Fiori

Smooth Brome

Annual or biennial, 25-110 cm. high. Culms laxly caespitose or solitary, erect, unbranched, smooth and glabrous or minutely hairy, with 2-5 nodes. Leaves 5-20 x 1.4-4 cm., stiff and open, finally somewhat contracted and nodding; branches clustered, unequal, up to 6 cm. long, each with 1-4 spikelets; pedicels up to 2.5 cm. long. Spikelets 12-16 mm. long, 4- to 8-flowered. Glumes persistent, unequal, the lower 4-6 mm. long, 3-veined, lanceolate, the upper 4.5-7 mm. long, 5- to 7-veined, ovate. Lemmas 6.5-8 mm. long, ovate; awn 5-9 mm. long, straight, scabrid, arising from below the apex. Anthers 2-2.5 mm. long. $2n = 28$. Fl. 3-5.

Fields, gardens and valleys. *Malta*: local as at Attard, Buskett, Wied Incita, Wied Ghasel, Luqa (Borg). *Gozo*: Rabat, Il-Lunzjata (Borg).

Throughout much of Europe to S. Scandinavia; introduced in N. America.

8. *B. secalinus* L.

Rye Brome

Annual or biennial 20-120 cm. high. Culms laxly caespitose or solitary, with 1-7 nodes. Leaves 10-25 x 0.4-1.0 cm., lanceolate, scabrid, more or less hairy; ligule 2 mm. long, denticulate. Panicles 5-20 cm. long, erect or finally pendulous, loose or more or less contracted; branches up to 8 cm. long, clustered, each with 1-4 spikelets or pedicels up to 3 cm. long. Spikelets 1.2-2.4 cm. long, ovate to oblong,

4. to 11-flowered. Glumes persistent, unequal, the lower 4-6 mm. long, 3- to 5-veined, ovate-oblong, the upper 5-8 mm. long, 5- to 7-veined, ovate-elliptical. Lemmas 7-9 mm. long, broadly elliptical, dorsally rounded, 7-nerved, becoming indurate except for the membranous margins; awn up to 8 mm. long, arising from the apex scabrid, or awnless. Anthers 2, 1-2 mm. long. Fl. 3-5.

Cultivated places. *Malta*: rare (Borg).

Europe; N. Africa; W. Asia; introduced in N. America.

9. *B. molliformis* Lloyd

Southern Brome

B. hordeaceus var. *molliformis* (Lloyd) Fiori

Annual 7-45 cm. high. Culms solitary or caespitose, erect or geniculately ascending, smooth, shortly pubescent at the nodes, with 1-3 nodes. Leaves 1.5-13 cm. x 0.2-0.4 mm., lanceolate, acuminate, softly hairy to glabrous; ligule up to 2 mm. long, serrate. Panicle 1.8-8 x 0.7-2 cm., more or less spike-like, erect, usually of many densely arranged spikelets; branches clustered, each with 1-5 spikelets. Spikelets 1-2 cm. long, 6- to 12-flowered, ovate to oblong. Glumes persistent, hairy, more or less unequal, the upper 6-9 mm. long, elliptical, the lower 5-6 mm. long, narrowly ovate. Lemmas 7.8 x 4.5 mm., obovate, with silky hairs, dorsally rounded with narrow hyaline margins, apex bifid; awn arising from the sinus, up to 7 mm. long, straight or curved, scabrid. Anthers 0.5-1 mm. long. Fl. 3-5.

Waste places. *Malta*, *Gozo* and *Comino*: frequent (Borg).

Mediterranean region.

10. *B. hordeaceus* L.

Plate LXI

Hurtan

B. mollis L.

Soft-brome

Annual or biennial 10-100 cm. high. Culms caespitose or solitary, erect or spreading, short hairy at the nodes, with 2-5 nodes. Leaves up to 20 cm. x 7 mm. lanceolate, flaccid, shortly and softly hairy; ligule up to 2.5 mm. long; denticulate, hairy. Panicle 1.5-1.6 x 3-6 cm., greyish-green or purplish; branches clustered, each with 1-5 spikelets; pedicels 2-10 mm. long. Spikelets 12-22 mm. long, narrowly ovate, 6- to 12-flowered, hairy. Glumes unequal, the lower 5-8 mm. long, ovate, the upper 6-9 mm. long, elliptical. Lemmas 8-11 x 4-5.5 mm., obovate to elliptical, hairy, shortly bifid at the apex; awn arising from below the apex, 5-10 mm. long, scabrid. Anthers 0.2-2 mm. long. $2n = 28$. Fl. 3-5.

Cultivated and waste places. *Malta*, *Gozo* and *Comino*: very common (S. & C.G. Borg; G. Lanfranco; Wolsley).

Throughout most of Europe; W. Asia; Macaronesia; introduced elsewhere.

11. *B. scoparius* L.

Broom Brome

Annual 8-35 cm. high. Culms caespitose or occasionally solitary, erect or spreading, finally geniculately ascending, smooth with 1-3 nodes. Leaves 2-15 x 0.1-0.6 cm., linear, acuminate, conspicuously long-hairy on upper surface, glabrous on lower surface; ligule up to 1 mm. long. Panicle 1.5-8 x 1-2.5 cm., obovate, of few to many spikelets, more or less dense; branches short. Spikelets 1.2-2.0 cm. long (including awns), sessile, ovate-lanceolate. Glumes unequal, ovate-acute, sparsely hairy, the upper 5-6 mm. long, the lower 4-5 mm. long. Lemmas 5-8 x 1-2.5 mm.

(excluding awns), lanceolate, with narrow membranous margin, deeply bifid at the apex; awn arising from the sinus, 7-10 mm. long, scabrid, recurved, sometimes twisted. Anthers 0.3-0.6 mm. long. Fl. 3-5.

Sandy valleys. *Malta*: rare at Wied Babu (Delicata; Borg).

Mediterranean region; W. & C. Asia; introduced in N. America.

19. *Brachypodium* Beauv.

Perennials or annuals, rarely woody below, with often extensively branched rhizomes. Inflorescence a raceme of distichous, alternate, shortly pedicellate spikelets, inserted with the back of the lemmas to the rachis. Spikelets 1(-3) at each node, usually with numerous florets. Glumes unequal, shorter than the lowest floret. Glumes and lemmas acuminate, mucronate or with a straight apical awn. Palea equalling or a little shorter than the lemma, emarginate or truncate, the keels ciliate or scabrid. Stamens 3. Lodicules 2, glabrous or ciliate on the margins. Ovary hairy at apex. Caryopsis narrowly elliptical to oblanceolate; hilum linear.

Awn equalling or exceeding lemma; plant caespitose or very shortly rhizomatous

1. *sylvaticum*

Awn not more than half as long as lemma, sometimes absent; plant with obvious creeping rhizomes

2. *retusum*

1. *B. sylvaticum* (Hudson) Beauv.

False Brome

Caespitose; stems erect or ascending, hairy at and sometimes near the nodes. Leaves 10-35 cm., bright or yellowish-green, usually flaccid and drooping, 6-12 mm. wide, rough, with scattered hairs above; veins pale, prominent beneath; ligule 1.5 mm., obtuse. Raceme 7-20 cm., with (3-)8-12 rather distant spikelets. Spikelets terete, linear, hairy or glabrous, somewhat patent, especially before maturity. Glumes acute, the lower 6-9 mm., the upper 8-11 mm., shortly aristate. Lemma 7-12 mm., lanceolate; awn 7-14 mm., straight or weakly flexuous. Anthers 3.5-5.5 mm. Caryopsis narrowly elliptical. $2n = 18, 28, 42 + 2B, 56$. Fl. 4-6.

Shaded places, rather rare. *Malta*: Grgenti, Buskett, Ta' Lawrence, Wied Ddella (Borg; G. Lanfranco).

Europe northward to 64° in Norway; Mediterranean region.

2. *B. retusum* (Pers.) Beauv.

Plate LXI

Mediterranean False Brome

B. pinnatum var. *ramosum* Roemer & Schultes

Rhizomatous, sometimes subcaespitose; stems 40-120 cm., erect, pubescent at the nodes. Leaves 10-40 cm., flat, or somewhat inrolled, 3-6(-8) mm. wide, sparsely hairy on the upper surface, scabrid beneath; ligule c. 2 mm., truncate. Raceme 7-20 cm., erect, with up to 15 spikelets. Spikelets terete, linear, somewhat patent, especially before maturity, with 8-24 florets. Lower glume 3-6 mm., the upper 5-8 mm. Lemma oblong-lanceolate; awn erect. Anthers 3.5-5.5 mm. Caryopsis narrowly elliptical. $2n = 14, 16, 28$. Fl. 4-6.

Dry rocky and stony places. Malta, Gozo, Comino and Cominotto: common (S. & C.G.; Borg; Wolseley).

Mediterranean region and S.W. Europe.

20. *Trachynia* Link

Annuals. Leaves flat. Spikelets 1-3(-7), compressed laterally, crowded at the apex of the long-exserted peduncle. Glumes persistent, unequal; lemmas awned from the apex with straight awn; stamens 3.

1. *T. distachya* (L.) L. Plate LXI
Brachypodium distachyon (L.) Beauv.

Trachynia Grass

Annual 5-30 cm. high. Culms solitary, stiffly erect or geniculately ascending. Leaves up to 120 mm. long, linear, acuminate, sparsely hairy. Inflorescence 1-3(-7) terminal, subsessile spikelets. Spikelets 2-3 cm. long, 6- to 12-flowered. Glumes and lemmas rounded on the back, strongly nerved; awn longer than lemma. Anthers c. 1 mm. long. Fl. 4-6.

Rocky and waste places, fields and roadsides. Malta, Gozo and Comino: common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region; W. & C. Asia; Macaronesia; E.C. & S. Africa; introduced elsewhere.

Tribe Triticeae Dumort. Annuals or perennials. Leaves linear; silica bodies rounded, elliptical or oblong; ligules membranous. Inflorescence a spike. Spikelets to many-flowered, solitary or in groups of 2-3, hermaphrodite, sessile and similar or the lateral pedicelled, male barren or much reduced, alternate and distichous on a tough or fragile rachis, disarticulating above the glumes or tough in cultivated species. Glumes often reduced, strongly veined, coriaceous; lemmas 6-nerved, awnless or awned; awn straight or recurved, not geniculate or hooked; stamens 3; styles 2; stigmas plumose. Chromosomes large, $n = 7$.

Economically a most important tribe of grasses which includes Wheat - *Triticum*, Barley - *Hordeum* and Rye - *Secale*, and some useful arid-land forage grasses.

21. *Aegilops* L.

Annuals. Leaves narrow, usually flat. Inflorescence a spike of long-awned, hermaphrodite, solitary spikelets at the nodes of the rachis, with 1-2 vestigial spikelets below and 1-2 rudimentary or male spikelets at the apex. Glumes indurated, truncate and awnless or with 1 to several awns or teeth. Lemmas membranous below, toothed or awned above. Stamens 3.

1. Uppermost spikelet fertile
Uppermost spikelet sterile
2. Spike ovoid, with only the uppermost spikelet sterile;
lowest glumes 7-8 mm. long
Spike elongated, contracted above, with 2 upper spikelets sterile; lower glume 8-11 mm. long.

1. *lorentii*
2. *ovata*
3. *triaristata*

1. *A. lorentii* Hochst
A. ovata var. *biuncinalis* Vis.

Mediterranean Aegilops

Annual 5-30 cm. high. Culms laxly caespitose, branching at the base, geniculately ascending, with 2-4 nodes. Leaves 1-3 cm. x 1.5-3 mm., lanceolate, flat or involute, upper surface and margins sparsely to densely long-hairy, lower surface and margins sparsely to densely long-hairy, lower surface glabrous to hairy; ligule a ring of hairs; sheaths more or less inflated, glabrous to sparsely hairy below. Spike 2-3 cm. long (excluding awns), with 3-4 spikelets, the lowest 1(-2) rudimentary. Fertile spikelets 2-3, ellipsoid. Glumes 7-9 x 5-6 mm., strongly 5- to 7-veined, becoming indurated; awns (2-)3, up to 5 cm. long, straight, rigid, scabrid. Lemmas with 1(-3) awns up to 1.5 cm. long, glabrous. Anthers c. 2.5 mm. long. $2n = 28$. Fl. 5-6.

Arid rocky places. Malta: local (G. Lanfranco); as at Wied Inčita, Buskett (Borg).

Mediterranean region.

2. *A. ovata* L. Plate LXI Ovate Aegilops

Annual up to 20 cm. high. Culms caespitose or solitary, erect or geniculately ascending, smooth, glabrous. Leaves 2-10 cm. x 2-4 mm., linear-lanceolate, hairy or glabrous; ligule rudimentary, membranous with silicate hairs at the margins. Spike 1-3 cm. long (excluding awns), 4-9 mm. wide, consisting of 1(-2) rudimentary spikelets at base, (2-)3 (-4) urn-shaped fertile spikelets and 1(-2) sterile or male spikelets at the apex. Glumes 7-8 x 5-6 mm., thick and coriaceous; awns 2-4(-5), patent, scabrid, rigid. Lemmas membranous below; awn tough, scabrid. Paleas 4-toothed. $2n = 28$. Fl. 3-6.

Arid places, coralline plateaus and valleys. Malta: locally frequent (G. Lanfranco); Xorid, Girgenti (S. & C.G.; Borg); Wied Qirida, Luqa, Wied Inčita, Buskett (Borg; Wolseley); Marsa (Borg); Wied il-Ghasel, Dingli Cliffs (Wolseley). Gozo: Ramla, Mgarr ix-Xini (S. & C.G.; Borg; Wolseley); Nadur, Mgarr, Xlendi (Borg; Wolseley); Ta' Cené (Wolseley). Comino: frequent (S. & C.G.; Borg; Wolseley).

Mediterranean region; W. Asia; N. Africa; Canaries.

3. *A. triaristata* Willd. Three-awned Aegilops
A. ovata var. *triaristata* (Willd.) Fiori

Annual up to 30(-45) cm. high. Culms laxly caespitose, erect or geniculately ascending, branched at the base, smooth, glabrous. Leaves 1.5-10 cm. x 2-5 mm., lanceolate, more or less flat or folded, glabrous to sparsely long-hairy; ligule reduced to a ring of hairs; sheaths glabrous below, more or less hairy above. Spike 2.5-6 cm. long (excluding awns), falling entire, with 2-3 rudimentary spikelets at the base and 4 spikelets above, the upper 2 sterile and reduced, so that the spike appears contracted above. Fertile spikelets 8-11 x 5-7 mm. (excluding awns), ellipsoid, with 5-7 unequally broad nerves; awns 2-3, 3-5 mm. long, straight, rigid, scabrid. Lemmas chartaceous, ovate; awns 1-3, short. Anthers 5-6 mm. long. $2n = 28, 42$. Fl. 5-6.

Sheltered valleys. Malta and Gozo: locally frequent (Borg; G. Lanfranco).

Mediterranean region; W. Asia.

22. *Triticum* L.

Spring or winter annuals. Leaves flat. Inflorescence a spike of solitary spikelets alternately arranged on the nodes of a flexuous, tough or fragile rachis. Spikelets 2- to 6(-9) flowered, the upper 1-2 usually sterile. Glumes subequal, asymmetrical, coriaceous, truncate, often with a crested keel and 1-2 teeth, apiculate or awned. Lemmas coriaceous, ventricose, awned or awnless. Palea membranous 2-keeled. Stamens 3.

1. Glumes strongly keeled in the upper half only, rounded below
Glumes strongly keeled from the base to the apex
2. Leaf-blades glabrous; endosperm flinty
Leaf-blades covered with a white pubescence; endosperm mealy

1. *T. durum* Desf.

T. aestivum var. *durum* (Desf.) Fiori

Plate LXI

Culms 70-140 cm. high, usually solid, smooth and glabrous at the nodes. Leaves 7-16 mm. wide, glabrous or minutely hairy. Spike 4-11 cm. long (excluding awns), laterally compressed, dense, rachis usually tough, ciliate on the margins and bearded at the nodes, not disarticulating at maturity. Spikelets 5- to 7-flowered, the lower 2-4 fertile, the upper 1-3 rudimentary and sterile. Glumes (8-)10-12 mm. long, coriaceous with a distinct keel from base to apex, winged in the upper third, glabrous or hairy, ending in a tooth. Lemma with a stout scabrous awn up to 20 cm. long. Endosperm flinty. $2n = 28$. Fl. 5-8.

Malta, Gozo and Comino: common (S. & C.G.; Borg; Wolseley).

Cultivated in the Mediterranean region; Asia; N. & S. America.

2. *T. turgidum* L.

T. aestivum var. *turgidum* (L.) Fiori

Qamh ta' l-Awstralja
Rivet Wheat

Culms 120-170 cm. high, thick-walled or filled with pith in the upper parts, glabrous at the nodes. Leaves 18 mm. wide, covered with a soft white white pubescence at least when young. Spikes 7-12 cm. long, oblong or even ovate when the spike is branched below; rachis tough, ciliate on the margins and bearded at the nodes, not disarticulating between the spikelets at maturity. Spikelets 5- to 7-flowered, the lower 3-4 fertile, the upper 2-3 rudimentary and sterile. Glumes 9-10 mm. long, broadly ovate, coriaceous with a prominent keel terminating in an acute curved apical tooth. Lemma with scabrid awns 8-16 cm. long. Endosperm mealy. $2n = 28$. Fl. 4-5.

Cultivated. Malta: occasional (Borg).

Cultivated in the Mediterranean region; C. Asia; S. Africa; N. & S. America.

3. *T. aestivum* L.

incl. var. *hibernum* L.

Tonnija
Bread Wheat

Culms 40-150 cm. high, erect, thin walled, hollow, glabrous at the nodes. Leaves 6-16 mm. wide, scabrous, pubescent when young. Spike 4-18 cm. long (excluding awns), oblong to fusiform, lax to somewhat dense, square in section; rachis tough; not disarticulating between the spikelets at maturity, with

at a tuft of hairs at the nodes. Spikelets broadly ovate, 3- to 6(-9)-flowered, the lower 3-4 fertile, the upper 1-2 rudimentary and sterile. Glumes c. 10 mm. long, truncate, rounded below, with a prominent crested keel in the upper half. Lemma awnless, or awned, awns 1-4 cm. long, divergent. Endosperm farinaceous, vitreous. $2n = 42$. Fl. 4-5.

Widely cultivated. Malta, Gozo and Comino: common (Borg; Wolseley).

Cultivated since antiquity in the temperate and subtropical zones of both hemispheres. Not found in the wild state and the country of origin is uncertain.

T. polonicum L. is occasionally cultivated (Borg); it differs from the above species in having longer membranous glumes 25-35(-40) mm. long, often concealing the lemmas.)

23. *Agropyron* Gaertner

Perennials. Leaves flat. Culms erect. Spike terminal with a tough continuous rachis. Spikelets sessile, alternating in 2 rows on opposite sides of rachis, with their broader sides adpressed to it, more or less erect; glumes more or less equal, shorter than the lowest lemma, obtuse, acute or awned; lemmas rounded on the back, awned or awnless. Stamens 3.

1. *A. junceum* (L.) Beauv.

Plate LIX

Mediterranean Couch

Perennial 25-50 cm. high, laxly caespitose, spreading extensively by rhizomes forming loose mats. Culms more or less rigid, erect or spreading, smooth, with 1-2 nodes. Leaves 10-35 x 0.2-0.6 cm., flat or convolute, finely pointed, glaucous with prominent ribs, above shortly and densely pubescent, smooth below; ligules 0.5-1 mm. long, truncate. Spike 4-18 cm. long, straight or curved, rachis fragile, readily breaking up beneath each lemma. Spikelets 10-20 mm. long, 3- to 5-flowered, cuneate and gaping at maturity. Glumes 6-15 mm. long, more or less equal, prominently 7- to 11-veined, narrowly oblong, blunt, tough and rigid. Lemmas overlapping, oblong-ovate, thick and rigid, blunt or emarginate, with a short hard apical mucro, 5-nerved. Fl. 6-8.

Coastal areas. Malta: rare (G. Lanfranco); as at Bahar ie-Caghaq, Mellicha (S. & C.G.; Borg; Wolseley); Marsa (G.D.; Borg); Ghadira is-Saira (Borg); Ramla tal-Bir (E. Lanfranco).

Mediterranean region.

24. *Hordeum* L.

Annuals or perennials. Leaves flat, auricled at base. Inflorescence a compressed or subterete spike. Spikelets at the nodes of a tough, or a brittle disarticulating rachis in alternate, distichous groups of 3, each group containing a hermaphrodite, subsessile, fertile central spikelet and 2 lateral sterile male, or rarely fertile, hermaphrodite spikelets; rachis always produced in the central spikelet and sometimes in the lateral ones. Glumes linear-subulate to linear-lanceolate, equal on the central spikelet, equal or dissimilar on the lateral spikelets. 1-nerved. Lemma 5-nerved, more or less long-awned, or the apex with produced a trilid appendage. Stamens 3.

1. Stems bulbous at base
Stems not bulbous at base

8. bulbosum

2.

2. Rachis tough, not disarticulating at the nodes at maturity; plants usually cultivated
Rachis fragile, disarticulating at the nodes at maturity; plants wild

3. Spikes with 2 rows of fertile spikelets; the central florets of each spikelet producing seed; lateral spikelets sterile or male
Spikes with 6 rows of fertile spikelets, all the florets of each spikelet producing seed

4. Glumes of central spikelet scabrous or glabrous
Glumes of central spikelet long ciliate on the margins

5. Glumes of lateral spikelets dissimilar, the outer subulate or awn-like, the inner lanceolate or winged below
Glumes of lateral spikelets similar, subulate or rarely linear-lanceolate

6. Anthers 0.2-0.5 mm. long; rachis densely ciliate at the nodes and margins
Anthers 0.7-1.4 mm. long; rachis sparsely ciliate or glabrous

7. Central spikelet sessile; lateral florets shorter than central one
Central floret stipitate; lateral florets longer than central one

1. *H. murinum* L.

Wall Barley

Annual 5-60 cm. high. Culms solitary or fasciculate, prostrate or geniculate, ascending, smooth, with 3-5 nodes. Leaves 2-20 cm. x 2-8 mm., linear-acuminate, glabrous or sparsely pubescent, with narrow spreading auricle at the base at the blade; ligules up to 1 mm. long; sheaths somewhat inflated above. Spike 2-7 cm. long, oblong, strongly compressed; rachis sparsely ciliate at the nodes and margins, disarticulating readily at maturity; pedicel of lateral florets 0.5-1 mm. long, central floret sessile. Spikelets 8-12 mm. long. Glumes of central spikelet and inner glume of lateral spikelet lanceolate, ciliate on both margins; outer glume of lateral spikelets subulate. Lemma lanceolate, obscurely 5-veined; awn 2-4 times as long as lemma. Anthers 0.7-1.1 mm. long. $2n = 14$. Fl. 5-8.

Waste and cultivated places, *Malta*, *Gozo* and *Comino*; infrequent (S. & C.G.; Borg; Wolseley).

C. & S. Europe north of S. Sweden; N. Africa; W. Asia; N. America.

2. *H. glaucum* Steudal

Glaucous Barley

Differs from *H. murinum* in having glaucous stems and leaves, sessile central florets; central palea 0.7-0.8 times as long as lateral one, rachis of lateral spikelets 1.2-2.5 mm. long, stout, orange, anthers 0.2-0.5 mm. long. $2n = 14$.

Not recorded for *Malta* but possibly not distinguished from *H. murinum*.

Mediterranean region; W. Asia; Africa.

1. *H. leporinum* Link

Plate LXI

Bunexxief

H. murinum var. *leporinum* (Link) Fiori

Mouse Barley

Differs from *H. murinum* in the pedicellate florets of central spikelet and central palea 0.7-1.4 mm. long. $2n = 28$. Fl. 4-6.

Probably an allotetraploid arising from hybridisation between *H. murinum* and *H. glaucum*.

Cultivated and waste places, roadsides and on walls, *Malta*, *Gozo* and *Comino*; common everywhere (S. & C.G.; Borg; G. Lanfranco; Haslam; Wolseley).

Mediterranean region; Asia; introduced in Australia, New Zealand and elsewhere.

4. *H. maritimum* Hudson

Bunexxief

H. maritimum Hudson

Sea Barley

5. *H. geniculatum* All.

Annual 5-60 cm. high. Culms solitary or fasciculate, erect or geniculate, ascending, unbranched, smooth, with 3-4 nodes. Leaves 15-80 x 1-3.5 mm., acute, glabrous to minutely pubescent; auricles obscure; ligules less than 1 mm. long; basal sheaths glabrous or pubescent with dense short hairs 0.1-0.25 mm. long. Spike 1.5-5 cm. long (excluding awns), oblong, narrowed at apex, dense; awns erect, later spreading. Spikelets 6-8 mm. long, subsessile, 1-flowered. Glumes sessile except the lower (inner) glume of the lateral spikelets which is broadly obovate at the base, 0.6-1.4 mm. wide, scabridulous. Lemma of lateral spikelets lanceolate, with a straight awn 3-5 mm. long, lemma of central spikelets ovate with awn up to 24 mm. long. Anthers 1.3-1.5 mm. long. $2n = 14$. Fl. 3-5.

Waste places and maritime sands, *Malta*; infrequent (G. Lanfranco); St. Paul's Bay, Mthaleb, Marsa (S. & C.G.; Borg); Pwales, Ghajn Tuffieha, Bugibba, Wied Incita, Ghajn Rihana (Borg). *Gozo*: Ramla, Wied il-Lunzjata (S. & C.G.; Borg); Dahlet Qorrot (Gulia; Borg); Nadur, San Blas, Ghajnsielem (Borg).

N. & S. Europe.

3. *H. geniculatum* All.

Mediterranean Barley

H. maritimum var. *gussoneanum* Parl.

Differs from *H. maritimum* in the inner glumes of lateral spikelets 0.2-0.5 (-0.7) mm. wide; subulate, slightly thickened, but not winged, and basal leaf sheaths with hairs 0.5-1.0 (-1.2) mm. long. $2n = 14$, 28. Fl. 3-5.

Dry grassy places and disturbed ground, *Malta*: Mthaleb, Bahrija (Borg). *Gozo*: Ghajnsielem, Qbajjar (Borg).

S. & S.E. Europe.

4. *H. distichon* L.

Xghir tal-birra

H. vulgare var. *distichon* (L.) Fiori

Two-rowed barley

Annual up to 90 cm. high. Culms solitary or fasciculate. Leaves up to 1.5 cm. wide, glabrous to scabrous. Spikes 6-12 cm. long, linear-oblong, compressed, distichous; rachis brittle, bearded at the margins. Lateral spikelets sterile, shortly stipitate, the central floret fertile and sessile. Lemma of fertile floret broadly

lanceolate, terminating in a strong, scabrid awn up to 15 cm. long. Lemma of sterile spikelets lanceolate, shortly aristate. $2n = 14$. Fl. 3-6.

Cultivated as a catch crop, sometimes with *H. vulgare*. Malta and Gozo: occasionally cultivated (Borg; Wolseley).

Cultivated in most of Europe.

7. *H. vulgare* L.
ind. *H. vulgare* var. *hexastichon* L.

Xghir
Barley

Differs from *H. distichum* in having the stems up to 130 cm. high, spike 4-12 cm. long, oblong, square or hexagonal in cross section, all spikelets fertile and all lemmas with stout awns up to 18 cm. long. $2n = 14$. Fl. 3-5.

Widely cultivated especially as a catch crop. Malta, Gozo and Comino: cultivated and temporarily naturalised near arable areas (Borg; Wolseley).

Cosmopolitan crop in temperate regions of the world and on mountains in the tropics.

8. *H. bulbosum* L.

Bulbous Barley

Perennial up to 100 cm. high, densely caespitose. Culms smooth, glabrous, with a bulbous swelling at the base, covered with brown, scarious scales on old sheaths. Leaves 0.3-0.7 cm. wide, scaberulous, sometimes covered with white hairs on the upper surface. Spike up to 14 x 1 cm., dense, at first greenish-yellow, finally straw coloured. Rachis disarticulating at the nodes at maturity. Lateral spikelets pedicelled, the central one sessile. Glumes setaceous, scabrid, aristate. Lemmas of the lateral spikelets muticous, that of the central with a slender arista. Fl. 3-5.

Arid, rocky and cultivated places among crops. Malta: rare at Mellieha, Ghadira, Selmu, Ghajn Zhuber, Wied il-Ghasel (Borg).

Mediterranean region; W. & C. Asia; tropical Africa.

Tribe Monermeae C.E. Hubbard. Annual grasses; leaves linear to linear-lanceolate, silica-bodies circular, oblong or elliptical; ligules membranous. Inflorescence a spike. Spikelets all alike, sessile, solitary, alternate, sunk in the cavities of an erect or arcuate axis. Glumes 2, or the lower suppressed, the upper covering the cavity; lemma 1-to 3-veined, hyaline, awnless; palea 2-veined; stamens 3; styles 2; stigmas plumose. Chromosomes large, base numbers 1, 13.

25. Parapholis C.E. Hubbard

Annuals. Leaves flat. Culms erect, rigidly curved. Inflorescence spike-like, rigid, erect or curved with spikelets alternate on a fragile rachis, breaking horizontally beneath each spikelet. Spikelets oblong, acute, with one bisexual floret. Glumes equal, placed side by side at each node, 5-veined. Lemmas 3-nerved, with lateral nerves short. Stamens 3.

Plants often prostrate, more or less densely tufted, strongly curved; glumes lanceolate, acute.

Plants erect, laxly branched; glumes acuminate.

1. *incurva*
2. *strigosa*

1. *P. incurva* (L.) C.E. Hubbard
Lepturus incurvus (L.) Druce

Plate LXI

Curved Hard-grass

Annual 2-20 cm. high. Culms solitary or usually fasciculate, branched in the lower part, smooth. Leaves 4-30 cm. x 1-2 mm., lanceolate, acuminate, flat or rolled, smooth beneath, scabrid on the veins above and margins; ligules 0.5-1 mm. long, obtuse. Spike 1-8 cm. long, rigid, awned, rarely straight, cylindrical; rachis smooth, jointed, the joints shorter than the spikelets. Spikelets 4-6 mm. long, solitary, appressed to the rachis. Glumes as long as spikelet, oblong-subulate, thick and rigid, glabrous. Lemma shorter than glumes, thinly membranous. Anthers 0.5-1 mm. long. $2n = 38$. Fl. 3-5.

Rocky ground and sandy places on the coast. Malta, Gozo and Comino: common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region; W. Europe; introduced in N. & S. America and Australia.

2. *P. strigosa* (Dumort) C.E. Hubbard
Lepturus incurvus var. *filiformis* auct.

Hard-grass

Annual up to 40 cm. high. Culms solitary or fasciculate, usually more or less erect, loosely branched, smooth. Leaves 1-6 cm. x 1.2-5 mm., smooth beneath, scabrid above and on the margins; ligule 0.3-1 mm., obtuse. Spike usually erect, smooth, jointed, the joints shorter than the spikelets. Spikelets 3-7 mm. long, solitary, appressed to the rachis. Glumes as long as the spikelet, oblong-subulate, acuminate, thick and rigid, glabrous. Lemma more or less as long as the glumes, membranous. Anthers 1.5-4 mm. long.

Sandy and rocky places on the coast. Malta: Marsa (G.D.; Borg); Għira (Borg); Salini (Borg; Wolseley).

Mediterranean region; W. Europe.

26. Monerma Beauv.

Annuals. Leaves involute or complicate. Inflorescence spike-like, with a tough rachis. Spikelets sessile, arranged alternately and distichously, sunk in cavities at the internodes. Spikelets hermaphrodite, 1-flowered. Glumes 2 in the terminal spikelets, 1 in the lateral spikelets covering the internode cavity, strongly veined. Lemmas without awn. Stamens 3.

1. *M. cylindrica* (Willd.) Cosson & Dur.
Lepturus cylindricus (Willd.) Trin.

Plate LXI

Cylindrical Hard-grass

Annual up to 30 cm. high. Culms solitary or fasciculate, more or less branched, smooth, glabrous, shining. Spike up to 15 cm. long, enclosed at its base by the uppermost leaf-sheath, or finally exerted, more or less straight. Glumes 5-7 mm. long, linear-lanceolate, with a strong median vein, coriaceous. Lemmas 5-6 mm. long, ovate-lanceolate, with a hyaline margin at apex, convolute. Anthers c. 2 mm. long. Fl. 3-5.

Arid coastal places. Malta: locally frequent (G. Lanfranco); Marfa peninsula. Wied Inetta (S. & C.G.; Borg); Buskett, St. Paul's Bay, Wardija (Borg). Gozo: Wied Bingemma (S. & C.G.; Borg); Mgarr, Qala, Mgarr ix-Xini (Borg).

Tribe Meliceae Reichenb. Perennials. Leaves flat, sheaths tubular; silica bodies rounded; ligule membranous or absent. Inflorescence a panicle, effuse with filiform branches, or spike-like with shortly pedicelled spikelets. Spikelets with 1 to several florets, hermaphrodite; rachis disarticulating above the glumes and between the florets, crowned with several sterile lemmas. Glumes more or less unequal, with scarious margins; lemmas 5- to many-nerved, dorsally rounded, membranous, more or less pilose or glabrous. Stamens 3. Chromosomes large, base number 9.

27. Melica L.

Characters of the tribe, which is monotypic.

- | | |
|---|---------------------------------------|
| 1. Spike bearing long white hairs when mature
Spike glabrous or minutely hairy | 1. <i>ciliata</i> |
| 2. Panicle 2-15 x 1-6 cm., simple or with a few short
branches below
Panicle 13-27 x 6-10 cm., branched regularly below | 2. <i>minuta</i>
3. <i>arrecta</i> |

1. *M. ciliata* L.

Ciliate Melick

Perennial 20-100 cm. high, rhizome stoloniferous. Culms solitary or caespitose, erect or geniculately ascending, with 3-6 nodes. Leaves 4-30 cm. x 1-4 mm., involute at apex, with striated sheath; ligule 3-4 mm. long, oblong. Panicle 4-20 cm. x 2-8 mm., spike-like, more or less unilateral; branches short, occasionally interrupted, whole inflorescence appearing long-hairy when mature. Spikelets 5-7 mm. long, ovate-lanceolate, with 1-2 fertile florets and 1 sterile floret. Glumes 4-8 mm. long, subequal, ovate-lanceolate, the lower somewhat broader than the upper, obscurely 3-to 7-veined, membranous. Lemmas 5-7 mm. long, ovate, acute, glabrous on the rounded dorsal surface, with a fringe of white hairs c. 4 mm. long. Anthers 0.5-1 mm. long. Fl. 4-6.

Two varieties occur: var. *nebrodensis* (Parl.) Cosson with culms 10-60 cm. high, leaves closely involute, setaceous; panicle 3-15 x 0.75-2 cm., unbranched or with few branches; glumes more or less equal; fertile and sterile lemmas scabrous; var. *magnoli* (Gren. & Godron) Pantoc. with culms 40-100 cm. high; leaves flat except near apex, leaves and sheaths smooth; panicle 8-20 x 1.5-3 cms. with many branches; glumes unequal; lemma glabrous, the sterile smooth, shining.

Arid rocky places on the coralline plateaus and valleys. Malta: infrequent (G. Lanfranco); as at Wied Babu, Wied Ghomor, Wied Inčita, Wied il-Ghasel (S. & C.G.; Borg; Wolseley); Falka pumping station (Gauci; E. Lanfranco). Gozo: Xlendi, Wied il-Lunzjata, Mgarr ix-Xini (Borg).

Much of Europe; W. Asia; N. Africa.

2. *M. minuta* L.

Plate LXII

Small Melick

Perennial 10-50 cm. high. Culms solitary or caespitose, slender, erect or geniculately ascending, minutely scabrid, with 1-5 nodes. Leaves 3-20 cm. x 1-2 mm., usually involute and setaceous; ligule 2.5-4 mm. long, obtuse, laciniate. Panicle 2-15 x 1-6 cm., branched below or simple, unilateral, green or purplish; branches filiform, flexuous. Spikelets 5-8 mm. long, pendulous, elliptical-oblong or gaping

with 1-2 fertile florets and 1-2 sterile florets. Glumes 4-8 mm. long, subequal, broadly ovate, acute, with scarious margins, sheathing and broadest at base, 5-veined, minutely hairy. Fertile lemmas similar to glumes, 9- to 11-veined, closely overlapping; sterile lemmas small, ovate, obtuse, membranous. Anthers 1.5-2.5 mm. long. Fl. 4-6.

Arid rocky places. Malta and Gozo: frequent (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region.

1. *M. arrecta* Kunze

M. minuta var. *arrecta* Kunze

Branched Melick

Differs from *M. minuta* in the culms 40-60 cm. high; leaves up to 5 mm. wide, flat, tapering towards the convolute apex; ligule 3-5 mm. long, with 2 lateral rounded processes at junction of lamina with sheath; panicle 13-27 x 6-10 cm., branched regularly below; spikelets 6-9 mm. long, with 2 fertile florets and 1 sterile; glumes subequal, faintly 5-veined; fertile lemmas rigid, strongly 9- to 11-veined, obovate with acute membranous apex.

Rocky valleys. Malta and Gozo: frequent (G. Lanfranco; Borg).

Mediterranean region.

Tribe Miliceae Endl. Annuals or perennials. Leaves linear; silica-bodies rounded. Inflorescence an effuse or narrow panicle; spikelets 1-flowered. Glumes 3-veined, subequal, persistent, imbricate; lemmas 5-veined, becoming indurated or chartaceous in fruit; stamens 3. Chromosomes large, base numbers 4,7,9.

28. Milium L.

Annuals or perennials. Leaves flat. Panicle effuse or narrow, with whorled branches. Spikelets ellipsoid, acute, 1-flowered. Glumes persistent, subequal, 3-veined, exceeding the floret. Lemma elliptical, acute, coriaceous, smooth, becoming indurated in fruit, margins folded round the palea. Stamens 3.

1. *M. vernale* Bieb.

Vernal Millet

Annual up to 45 cm. high, more or less caespitose. Leaves 4-7 cm. long, linear-lanceolate, acuminate, more or less scabrid. Panicle 4-11 x 6 cm., contracted, branches ascending; pedicels 2-5 mm. long. Spikelets 2.5-3 mm. long, elliptical, acute, crowded, bright green to purplish. Glumes tuberculate, scabrid. Lemma smooth, shining. Anthers c. 1.5 mm. long. Fl. 4-6.

Sandy damp valleys. Malta: Wied Inčita (Delicata; Borg).

W. C. S. & S.E. Europe; W. & C. Asia; N. Africa.

M. effusum L. has been included in Borg on the basis of a record by Delicata from Kordin. It is a plant of woodlands and differs from *M. vernale* in being a perennial with effuse, elliptical-ovate panicle 10-40 x 20 cm. wide, with spreading, deflexed branches, having spikelets 3-4 mm. long.

Tribe Agrostidae Dumort. Slender annuals or perennials. Leaves flat, linear, acuminate; silica bodies elliptical-oblong. Inflorescence an effuse or dense spike.

like panicle. Spikelets 1-flowered, hermaphrodite, rachis disarticulating above the glumes, rarely produced beyond the floret as a bristle. Glumes usually persistent, equal or more or less unequal, awned or awnless; lemma with 2-lobed or entire apex, awned or awnless; palea present or absent, 2-veined; stamens 3, 2 or 1. Chromosomes large; base number 7.

29. *Ammophila* Host

Glabrous, erect perennials. Leaves convolute. Panicles spike-like, dense, more or less cylindrical. Spikelets 1-flowered, compressed. Glumes longer than lemma, keeled, the lower 1-veined, the upper 3-veined. Lemma 5- to 7-veined, apex bifid; awn terminal, short. Rachis silky. Stamens 3.

1. *A. arenaria* (L.) Link

Plate LXIII

Marram

Perennial 50-120 cm. high, caespitose. Rhizome rigid, branches extensively creeping. Culms rigid, smooth, with few nodes. Leaves up to 60 cm. x 6 mm., involute, rigid; ligule 10-30 mm. long, acute. Panicle 7-20 cm. x 10-25 mm., spike-like, dense; branches erect; pedicels 1-4 mm. long. Spikelets 10-16 mm. long, laterally compressed, 1-flowered. Glumes persistent, more or less equal, scabrid on keel and sides. Lemma 8-12 mm. long, obtuse, with an awn, 0.2-0.8 mm. long, near the apex, shortly hairy at the base. Anthers 4-7 mm. long. $2n = 28$, 56. Fl. 4-6.

Sandy maritime places. *Malta*: not frequent (G. Lanfranco); Ghadira (S. & C.G.; Borg; Haslam; Wolsley); St. Paul's Bay (Reade; S. & C.G.; Borg; Wolsley); Maria peninsula (Borg; Wolsley); Wied Gerzuma (Haslam); Golden Bay (Wolsley); Ramla tat-Torri (Lanfranco; Gauci).

Coasts of W. Europe, except the Arctic.

(*Apera interrupta* (L.) Beauv. was recorded by Borg as occurring in lawns.)

30. *Agrostis* L.

Annuals or perennials. Leaves usually flat. Panicle effuse or contracted with numerous, small, 1-flowered spikelets. Glumes persistent, more or less equal, 1-veined. Lemmas hyaline, truncate, awnless or awned from the dorsal surface. Stamens 3.

1. *A. stolonifera* L.

A. alba L.

Creeping Bent

Perennial 8-40 cm. high, caespitose. Culms smooth, erect or geniculate ascending, rooting at the lower nodes. Leaves 1-10 cm. x 0.5-5 mm., minutely scabrid; ligule 1-6 mm. long, obtuse. Panicle 1-13 cm. x 4-25 mm. in flower, afterwards contracted; branches clustered. Spikelets 2-3 mm. long, 1-flowered. Glumes acute, 1-veined, scabrid on the keel. Lemma obtuse, 5-veined, awnless or with short awn. Palea up to $\frac{3}{4}$ the length of the lemma. Anthers 1-1.5 mm. long. $2n = 35$, 42. Fl. 4-7.

Damp sandy places. *Malta*: rare at Marsa (G.D.; S. & C.G.; Borg); Wied Hanġar (Borg).

Europe; Asia; N. America; introduced in Australia, New Zealand, S. Africa and Falkland Islands.

31. *Alopecurus* L.

Annuals or perennials. Leaves flat. Panicle spike-like, dense, more or less cylindrical. Spikelets 1-flowered, strongly laterally compressed. Glumes persistent, subequal, equalling or slightly exceeding the floret, often connate below the middle. Lemma awned from the back (rarely awnless), often connate below. Stamens 3.

Perennial; glumes connate only at the base
Annual; glumes connate for $\frac{1}{2}$ to $\frac{3}{4}$ their length

1. *pratensis*
2. *myosuroides*

1. *A. pratensis* L.

Denb. 2-Gardien
Meadow Foxtail

Perennial 30-120 cm. high, caespitose. Culms erect or geniculate ascending, smooth, with few nodes. Leaves 6-40 cm. x 3-10 mm., acute; ligule 1-2.5 mm. long, obtuse. Panicle 2-13 cm. x 5-10 mm., spike-like, dense; branches short, erect. Spikelets 4-6 mm. long, 1-flowered. Glumes more or less equal, connate at the base, 3-veined, ciliate on the keel. Lemma obtuse, 4-veined, awned from the lower $\frac{1}{2}$ of the midrib. Anthers 2-3.5 mm. long. $2n = 28$. Fl. 3-6.

Damp grassy places. *Malta*: rare (G. Lanfranco); at Marsa along the water-course (G.D.; S. & C.G.; Borg).

Europe; N. Asia; Caucasus; introduced in N. America.

2. *A. myosuroides* Hudson

Slender Foxtail

Annual 15-45 cm. high, solitary or caespitose. Culms smooth, glabrous, erect or geniculate ascending, with 1-3 nodes. Leaves 3-15 cm. x 2-7 mm., flat, linear-lanceolate, scabrid on both surfaces; ligule 2-4 mm. long, obtuse. Panicle 3-12 cm. x 3-7 mm., dense, erect or curved, green or purplish. Spikelets 4-6 mm. long, minutely hairy. Glumes more or less equal, connate in their lower $\frac{1}{2}$, scarious at the apex, silky hairy on the veins. Lemma subequal to glumes, ovate, shortly bifid; awn c. 8 mm. long, arising from the base. Anthers 3-5 mm. long. $2n = 14$. Fl. 3-5.

Disturbed places. *Malta*: Mizieb (Silverwood).

Europe from Sweden southwards; N. Africa; W. Asia; introduced in N. America and New Zealand.

32. *Cornucopiae* L.

Annuals. Culms fascicled. Leaves flat. Panicle a compound spike; branches short, peduncles stout, recurved, often partly enclosed in the uppermost inflated leaf-sheaths. Spikelets 1-flowered, hermaphrodite, laterally compressed, enclosed in coriaceous, dentate involucre. Glumes equal, ciliate on the keels, shallowly lobed at the apex. Lemma 5-veined, awnless or with the 5th vein protruding on the dorsal surface as a short awn. Stamens 3.

1. *C. cucullatum* L.

Plate LXII

Hooded Grass

Annual up to 45 cm. high, caespitose. Culms simple or branched. Leaves up to 10 cm. long, with broad sheath, often inflated on the culm. Peduncles 2-5, clavate above, each with a funnel-shaped involucre, hardened, with 3-10 teeth along the rim. Involucre enclosing several sessile spikelets. Spikelets 6-7 mm.

long. Glumes subequal, narrowly elliptic-oblong, obtuse, connate at the base. Anthers c. 4 mm. long. Fl. 3-4.

Waste places. *Malta*: Argotti gardens (Wolseley). *Gozo*: rare at Zebbug (S. & C.G.; Borg).

Europe and Asia.

33. *Gastridium* Beauv.

Annuals. Leaves flat. Panicle more or less spike-like, tapering upwards, shining. Branches short, erect, scabrid. Spikelets shortly pedicellate, with one bisexual floret, swollen below. Glumes persistent, somewhat unequal, with firm shining swollen bases, keeled, subulate. Lemma very short, truncate, 5-veined with median vein produced as an awn, or awnless. Stamens 3.

1. *G. ventricosum* (Gouan) Schinz & Thell.
G. leudigerum (L.) Desv.

Plate LXII

Nitens

Annual, 10-60 cm. high. Culms fascicled or solitary, erect or geniculate, ascending, smooth, with 2-4 nodes. Leaves 2-10 cm. x 2-4 mm., acute, margin scabrid; ligule 1-3 mm. long. Panicle 2-10 cm. x 5-12 mm., cylindrical, tapering upwards; branches closely divided, scabrid; pedicels 0.5-2 mm. long. Spikelets 1-2 mm. long, densely overlapping, 1-flowered. Glumes persistent, acute, scabrid, the keel, 1-veined, the lower as long as the spikelet, the upper shorter. Lemma dorsally rounded with denticulate apex; awn arising from below tip, 3-4 mm. long, contorted and geniculate. Anthers 0.6-0.8 mm. long, $2n = 14$. Fl. 3-5.

Rocky uncultivated places and fields. *Malta*, *Gozo* and *Comino*: locally common (S. & C.G.; G. Lanfranco); as at Buskett, Dingli (Borg; Wolseley), Wied Żgħir, Dar il-Bajda, Fawwara, Wied Gerżuma (Borg).

Mediterranean region; S.W. Europe; Azores.

34. *Triplachne* Link

Annuals or short-lived perennials. Panicle spike-like. Spikelet 1-flowered, hermaphrodite. Glumes chartaceous, subequal, persistent. Lemma awned from the base. Stamens 1-2.

1. *T. nitens* Link

Plate LXI

Shining Grass

Plant 7-40 cm. high, caespitose or solitary. Culms erect or geniculate at base, smooth, sparsely hairy with 2-5 nodes. Leaves 0.5-4 cm. x 2.5-4 mm., lanceolate, with inflated sheaths, minutely pubescent; ligule up to 4 mm. long. Spikelets 0.6-1.2 cm., exserted, enclosed in uppermost leaf-sheath; pedicels 0.25-2 mm. long, swollen towards spikelet. Spikelets 3-5 mm. long, 1-flowered. Glumes 3-5 mm. long, glabrous to sparsely hairy, shining, lanceolate, acute. Lemma 2 mm. long (excluding awn), with biaristate apex, sparsely long-hairy; awn arising from base, 3-5 mm. long, geniculate. Anthers 0.3-1.6 mm. long. Fl. 3-5.

Sandy coastal places. *Malta*: Marfa peninsula (Wolseley); at Ramla tal-Għor (S. & C.G.; Borg); Ramla tal-Bir (Borg; E. Lanfranco).

Mediterranean region; Canaries.

35. *Phleum* L.

Annuals or perennials. Leaves flat. Panicle spike-like, cylindrical or ovoid, dense. Spikelets closely imbricate, pedicelled, firmly compressed, bisexual, 1-flowered, falling entire from the pedicels. Glumes equal, strongly keeled and pectinate, ciliate on the keel, 3-veined, acute to shortly aristate. Lemma shorter than glumes, truncate or bluntly acute, 3-5-veined. Stamens 3.

Perennial 40-150 cm. high; glumes truncate

1. *pratense*

Annual 10-30 cm. high; glumes narrowed into aristate apex

2. *subulatum*

P. pratense L.

Timothy

Perennial 40-150 cm. high. Culms loosely to densely fasciculate, smooth, with 1-3 nodes, the basal 1-3 internodes short and more or less swollen. Leaves up to 5 cm. x 3-9 mm., the upper shorter, ligule c. 2 mm. long, obtuse, torn. Panicle 10-15 (-20) x 0.6-1 cm., dense; pedicels short. Spikelets 3-3.8 mm. long (including awn), compressed. Glumes persistent, narrowly oblong, truncate, margin of lower glume lanate, upper glabrous; awn arising from apex, 1-2 mm. long, rigid, scabrous. Lemma broad, obtuse. Anthers c. 2 mm. long. $2n = 42$. Fl. 4-5.

Malta: rare at Wied Balluta (Delicata; Borg).

Europe; N. Africa; Asia; widely cultivated.

P. subulatum (Savi) Ascherson & Graebner

Mediterranean Catstail

Annual 10-30 (-40) cm. high, caespitose or solitary. Culms erect or geniculate, ascending, smooth, glabrous, with 1-6 nodes. Leaves 1.5-12 cm. x 1-4 mm., linear, acuminate, flat or convolute, glabrous, scabrid on the veins; ligule up to 5 mm. long. Panicle up to 0.8-1.0 x 0.2-0.7 cm., cylindrical, stiff, erect, glaucous. Spikelets 1-1.4 mm. long, strongly laterally compressed. Glumes more or less hemispherical or hemielliptical gradually narrowed into an aristate apex, glaucous, glabrous, often minutely papillose; keel usually glabrous or sometimes fringed with fine spreading hairs. Lemma $\frac{1}{2}$ length of glume, 5- to 7-veined. Anthers 1.4-2.0 mm. long. Fl. 3-4.

Cultivated land. *Malta*: very rare at Wied Ghomor (Delicata; Borg).

Mediterranean region.

36. *Lagurus* L.

Many annuals. Panicle spike-like, ovoid, lanate. Spikelets strongly compressed, sessile, 2-flowered. Glumes persistent, subequal, pectinate-ciliate, 1-nerved. Lemma membranous, more or less equalling glumes, rounded dorsally, 5-nerved, with geniculate awn. Stamens 3.

L. ovatus L.

Plate LXVI

Demb il-fenek

Annual, 5-60 cm. high. Culms solitary or fasciculate, with few nodes. Leaves 1-20 cm. x 2-14 mm., linear-lanceolate; upper sheaths somewhat inflated, villous; ligule up to 3 mm. long, obtuse. Panicle 10-70 x 6-20 mm., globose to ovoid, dense, branched, branches short; pedicels 0.5-2 mm. long. Spikelets 3-10 mm. long, loosely overlapping, 1-flowered. Glumes persistent, equal, narrowly lanceolate, pectinate-ciliate, with a setaceous apex. Lemma ovate-lanceolate, with a bifid se-

taceous apex; awn arising from mid-dorsal surface, 8-18 mm. long, geniculate. Anthers 1.5-2 mm. long. $2n = 14$. Fl. 3-7.

Valleys, roadsides and waste places. *Malta*, *Gozo* and *Comino*: very common (S. & C.G.; Borg; G. Lanfranco; Haslam; Wolseley).

Mediterranean region; S.W. Europe; Macaronesia.

37. *Polypogon* Desf.

Annuals or perennials. Leaves flat. Panicle more or less spike-like, dense, bristly. Spikelets falling entire when mature, small, 1-flowered. Glumes subequal, much exceeding lemma, obtuse, bifid, 3-veined, usually awned. Lemma elliptical, truncate at apex, obscurely 5-veined, hyaline and shining at maturity, usually shortly awned. Stamens 3.

1. Glumes awnless
Glumes awned
2. Margins of the glumes densely ciliate in the upper half; lemma awnless
Margins of the glumes hairy on the margins, not ciliate; lemmas awned

1. *P. maritimus* Willd.
incl. *P. subspatheus* Req.

Annual up to 15 cm. high. Culms erect or geniculately ascending, smooth, glabrous. Leaves up to 5 cm. long, acute. Panicle 1-4 cm. long, erect, dense, cylindrical. Spikelets 2-2.5 mm. long. Glumes obtuse, deeply notched at the apex, densely ciliate along the margin in the upper half; awns conspicuous, up to 1 mm. long. Lemma awnless, with hooked structures at the base, more or less glabrous towards the apex. Anthers c. 0.5 mm. long. Fl. 3-5.

Damp valleys and shady places. *Malta*, *Gozo* and *Comino*: common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region; W. & C. Asia; Macaronesia; introduced in Australia, New Zealand, S. Africa and N. America.

2. *P. monspeliensis* (L.) Desf.

Plate LXII

Demb il-Jibru
Annual Beard-grass

Annual 6-80 cm. high. Culms solitary or fasciculately erect or geniculately ascending, with 3-6 nodes, more or less branched at base. Leaves 3-15 cm. x 2-8 mm. linear-lanceolate, acuminate; sheaths more or less inflated above; ligule 3-15 mm. long, oblong acute, with dentate apex. Panicle 1.5-16 x 1-3.5 cm., dense, narrowly ovate, cylindrical or lobed; branches closely divided. Spikelets 2-3 mm. long. Glumes equal, similar, dorsally rounded below, keeled above, obtuse, notched at apex, shortly ciliate on the margins; awn 4-7 mm. long, straight. Lemma obtuse, denticulate at the apex, awnless or with short awn up to 2 mm. long. Anthers 0.4-0.7 mm. long. $2n = 28$. Fl. 3-5.

Valleys and waste places. *Malta*: locally frequent (G. Lanfranco); *Floriana*, *Hamrun*, *St. Paul's Bay* (S. & C.G.; Borg); *Girgenti*, *Mtaleb* (S. & C.G.; Borg;

Wolseley); *Buskett*, *Bahrija* (Borg; Wolseley); *Gnejna* (Wolseley); *Gozo*: *Ta' Gurdan*, *Rabat* (Borg); *Xlendi* (Gulia; Wolseley); *Marsalforn* (Borg; Wolseley).

Mediterranean region; S.W. Europe; Asia; Azores; Ethiopia; S. Africa; introduced elsewhere.

3. *P. semiverticillatus* (Forsk.) Hyl.
Agrostis alba var. *verticillata* Vill.

Plate LXII

Water Bent

Annual or perennial 10-60 cm. high, with long stolons rooting at the nodes. Culms finally erect, often branching in the lower part, smooth. Leaves 3-18 cm. x 3-10 mm., linear-lanceolate, glabrous; ligules 1.5-6 mm. long, obtuse. Panicle 2-15 x 0.6-4 cm., ovate to oblong, dense, lobed, sometimes interrupted below; branches semiverticillate, crowded with spikelets. Spikelets 1.7-2.2 mm. long, awnless. Glumes equal, obtuse, dorsally rounded below, keeled above, scabrid. Lemma obtuse, minutely denticulate at the apex. Anthers 0.5-0.7 mm. long. $2n = 28$. Fl. 4-10.

Along streams on stream beds in valley bottoms. *Malta*: locally frequent as at *Mtaleb*, *Gnejna*, *Gnien il-Kbir* (S. & C.G.; Borg); *Wied Gertuma* (S. & C.G.); *Buskett*, *Ghajn Tuffieha* (Borg; Wolseley); *Fiddien* (S. & C.G.; Borg; Wolseley); *Mistra*, *Argotti* Botanic gardens in pool (Wolseley); *Bahrija* (G. Lanfranco); *Gozo*: *Xlendi*, *Wied ir-Rihan* (S. & C.G.; Borg; Wolseley); *Wied il-Lunzjata*, *Mgarr ix-Xini* (Borg).

S. Europe; S.W. & C. Asia; N. Africa; Macaronesia; introduced elsewhere.

Tribe *Avenae* Dumort. Annuals or perennials. Leaves narrow, linear; silica bodies elliptical-oblong; ligule well developed, membranous. Inflorescence an effuse or dense panicle, rarely a raceme. Spikelets all alike, 2- to 7-flowered, more or less laterally compressed, florets hermaphrodite or the uppermost reduced, or when only 2 florets the lower male and the upper hermaphrodite, rachis disarticulating above the glumes and between the florets in the wild species, tough in the cultivated oats. Glumes persistent, equal or unequal, usually as long as or longer than the spikelets; lemmas 5- to 7-veined, hyaline or scarious on the margins, entire or 2-lobed at the apex, awned; awn twisted and usually geniculate; palea hyaline, 2-veined; stamens 3, 2 or 1, styles 2; stigmas plumose. Chromosomes large, base number 7.

38. *Aira* L.

Slender, glabrous annuals. Leaves short, narrow. Panicle compound. Spikelets 2-flowered, somewhat compressed. Glumes equal, as long as, or longer than the spikelet, 1-veined. Lemmas 3-veined, apex with 2 setaceous points, base with a tuft of hairs; awn dorsal, geniculate, arising from middle. Stamens 2.

1. Spikelets 2-3 mm. long
Spikelets 1.5-2 mm. long
2. Panicle more or less contracted; pedicels 1-2.5 mm. long.
Panicle more or less effuse; pedicels 3-6 (10) mm. long
1. *A. caryophylla* L.
Silver Hair-grass
2. *A. caryophylla* L.
Silver Hair-grass
3. *A. elegans*

Annual 3-40 cm. high. Culms caespitose, branched or solitary, erect or spreading. Leaves 3-50 x 3 mm., obtuse, involute; ligules up to 5 mm. long, arose at the

apex. Panicle 1-12 x 1-2 cm., diffuse, axis more or less flexuous; branches 10-15 mm. long; pedicels 1-10 mm. long. Spikelets 2.5-3.5 mm. long, 2-flowered. Glumes persistent, more or less equal, 1-to 3-nerved, acute, scabrid on keel. Lemma geniculate-awned from near the middle of the midrib. Anthers 0.3-0.6 mm. long. $2n = 14$. Fl. 4-5.

Arid places. Malta: Wied Babu (GD.).

C. & S. Europe; W. Asia; much of Africa but only on mountains in the south introduced in N. & S. America.

2. *A. cupaniana* Guss. Plate LXII
A. capillaris var. *cupaniana* (Guss.) Fiori

Southern Hair-grass

Annual 3-30 cm. high. Culms caespitose or solitary, erect or geniculate, ascending, smooth, with 1-3 nodes. Leaves 1-7 cm. x 0.5-2 mm., acute, flat or involute; ligules up to 3 mm. long, acute. Panicle 1-12 x 0.5-2.5 cm., arising from uppermost leaf-sheath, contracted; finally more or less effuse with spikelets clustered on the branch ends. Pedicels 1-2.5 mm. long. Spikelets 1.5-2 mm. long, 2-flowered. Glumes 1.5-2 mm. long, 2-flowered. Glumes 1.5-2 mm. long, persistent, more or less equal, thinly membranous, obtuse. Lemma shorter than glumes, bifid at apex, geniculate-awned from below the middle of the midrib, awn exceeding glumes. Fl. 3-5.

Arid places. Malta and Gozo: frequent (Borg; G. Lanfranco; Kramer & West; Wolseley).

W. Mediterranean region.

3. *A. elegans* Willd.
A. capillaris Host

Mediterranean Hair-grass

Differs from *A. cupaniana* in the panicle 4-14 x 2-7 cm., at first contracted finally effuse; branches long filiform, divided 1-4 times; pedicels 3-6 mm. long; glumes acute, scarious at apex. Fl. 3-5.

Arid places. Malta and Gozo: locally frequent as at Valletta, Floriana, Marsa, Wied Inċita, Zebbuġ, Zabbar (Borg).

Mediterranean region.

39. *Avena* L.

Annuals. Leaves flat. Panicle effuse, with pedicelled spikelets. Spikelets 1-to 3-veral-flowered, hermaphrodite; axis fragile in wild species, tough in cultivated forms. Glumes equal or markedly unequal, the lower 5- to 7-veined, the upper to 9-veined. Lemmas 7-veined, 2-lobed or entire, with geniculate awn arising from about the middle of the midrib. Stamens 3.

1. Lemmas with 2 awn-like bristles from the apex in addition to the dorsal awn.
Lemmas without 2 awn-like bristles
2. Lemmas readily disarticulating above the glumes and between the florets at maturity
Lowest lemma only disarticulating

1. *barbata*

2. *fatua*

3. *sterilis*

1. *A. barbata* Pott ex Link Plate LXII
A. sativa var. *barbata* (Pott ex Link) Fiori

Harfur
Barbed Oat

Annual up to 100 cm. high. Culms solitary or fasciculate, glabrous. Leaves up to 30 cm. x 15 mm., linear, acuminate; ligules up to 5 mm. long, scarious. Panicle 15-30 x 3-15 cm., effuse; branches slender; pedicels nodding. Spikelets 30-60 mm. long (including awns), 2- to 3-flowered. Glumes 2-3 cm. long, more or less equal, tapering to an acute apex. Lemmas all articulated to the rachis, bifid with 2 scarious bristles, bearded in the lower half; awn from below the middle of the dorsal surface, stout, geniculate. Anthers 3-3.5 mm. long. Fl. 3-6.

Grows among crops, waste ground, roadsides and arid places. Malta, Gozo and Comino: common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

C. & S. Europe; W. & C. Asia; Canaries; introduced elsewhere.

1. *A. fatua* L.

Harfur
Common Wild-oat

Annual 30-150 cm. high. Culms caespitose or solitary, with 3-5 nodes, smooth. Leaves 10-45 cm. x 3-15 mm., linear, acuminate, scabrid; ligules up to 6 mm. long, obtuse. Panicles 15-20 x 20 cm., nodding, effuse; branches widely spreading; pedicels unequal. Spikelets 18-25(30) mm. long, 2- to 3-flowered, nodding. Glumes persistent, lanceolate, acuminate, glabrous. Lemmas shortly 2-toothed at apex, stiffly hairy at the base, becoming brown, with a dense beard 1.5-4 mm. long around the horse-shoe shaped basal scar; awn arising from middle of dorsal nerve, 2.5-4 cm. long, geniculate, tortuous. Anthers 3 mm. long. $2n = 42$. Fl. 3-5.

Grows among crops of sulla, wheat and barley. Malta: rare (Borg; G. Lanfranco).

Europe; N. Africa; Canaries; Asia; introduced elsewhere.

1. *A. sterilis* L.
A. sativa var. *sterilis* (L.) Fiori

Harfur
Animated Oat

Annual up to 1 m. high, solitary or fasciculate. Leaves up to 35 cm. x 12 mm., scabrid, sometimes hairy on the sheath and margins and upper surface of the leaf; ligule up to 6 mm. long, obtuse, scarious. Panicle 15-50 x 6-15 cm., branched in a whorl, effuse, with spikelets borne at the end of long nodding pedicels. Spikelets 6-9 cm. long (including awns), 3- to 4-flowered, the lower 1-2 florets bearded, awned and disarticulating from the axis at maturity, the upper 1-2 florets beardless, awnless and not disarticulating from the axis at maturity. Glumes 3.5-5 mm. long, more or less equal, tapering to an acute apex. Lemmas 2- to 4-fid at apex, bearded in lower half; awn arising from middle of dorsal nerve, stout, geniculate. Fl. 3-5.

Grows among crops in valleys and on waste ground. Malta, Gozo and Comino: common (Borg; G. Lanfranco; Wolseley).

Mediterranean region; W. Asia; Macaronesia; introduced elsewhere.

40. *Gaudinopsis* Eig

Annuals. Leaves short, plicate or convolute, firm. Inflorescence a spike-like raceme of dorsally crowded spikelets on short thick pedicels. Spikelets hermaphrodite, 4-

to 10-flowered. Glumes somewhat unequal, the lower shorter than the upper. Lemmas awned below apex except in lowest lemma which is awnless. Stamens 3.

1. *G. macra* (Bieb.) Eig.

Gaudin's Grass

Annual 10-30 cm. tall, solitary or caespitose. Culms slender, erect or geniculately ascending, smooth, glabrous, with 1-2 nodes. Leaves 1.5-10 cm. x 1-2 mm., lanceolate, plicate or convolute, sometimes setaceous; ligules 1-2 mm. long, laciniate. Raceme spike-like, 3-12 x 0.75-2 cm.; branches filiform, erect. Spikelets 9-12 mm. long, lanceolate, with stout pedicels. Glumes unequal, strongly 7-veined with hyaline margins, lanceolate, acute, the upper 9-12 mm. long, the lower 4 mm. long. Lemmas lanceolate, acute, 5-veined, except the lowest awned from the mid-dorsal surface; awn 7-15 mm. long, twisted at the base, geniculate. Anthers 0.75-2.5 mm. long, Fl. 4-6.

Rocky places in valleys. *Malta*: rare at Wied Qannotta (E. & G. Lanfranco).

S.E. Europe; W. & C. Asia.

41. *Lophochloa* Reichenb.

Annuals. Leaves flat. Panicle spike-like, dense or more or less loose. Spikelets compressed, 3- to 5-flowered, hermaphrodite or uppermost reduced. Glumes persistent, equal or unequal, the upper broader and longer than the lower, 3-nerved. Lemmas keeled, glabrous or hairy, bifid at the apex, with apex obtuse or with short, straight or geniculate awns. Stamens 3.

1. *L. phleoides* (Vill.) Reichenb.

Plate LXIII

Mediterranean Oat

Koeleria phleoides (Vill.) Pers.

Annuals up to 40 cm. high. Culms erect or geniculately ascending. Leaves linear-lanceolate, sheaths and blades with soft white hairs; ligule reduced. Panicle 1-8 cm. long, dense, more or less lobed. Spikelets sessile. Glumes unequal, glabrous or pubescent. Lemmas with tessellate appearance between the veins; awn as long as lemma. $2n = 26$. Fl. 2-5.

Cultivated and waste places, *Malta*, *Gozo* and *Comino*: very common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region; Macaronesia; W. & C. Asia; introduced elsewhere.

42. *Trisetum* Pers.

Caespitose perennial with creeping rhizomes. Panicle more or less spike-like, dense or lax; branches short with many spikelets. Spikelets strongly compressed, shining, several-flowered; florets hermaphrodite, glumes persistent. Glumes unequal, the lower 1-veined, the upper 3-veined. Lemmas 5-veined, dorsally awned. Stamens 3.

1. *T. aureum* Ten.

Plate LXIII

Golden Oat

Perennial 8-40 cm. high, caespitose. Culms erect or more usually geniculately ascending, smooth, shining, with 1-4 nodes. Leaves 1.5-8 x 0.2-0.4 cm., lanceolate, flat; ligule 1-2 mm. long, obtuse, laciniate. Panicle 1.5-6 x 0.75-3 cm., ovate, frequently partly enclosed in uppermost leaf-sheath when young, later dense to lax; branches verticillate, filiform, flexuous. Spikelets 2-4 mm. long (without awn), greenish-gold to shining gold, 2-(-3)-flowered, gaping. Glumes membranous, shin-

ing, the upper 2-4 mm. long, broadly ovate-lanceolate, the lower 1.5-3 mm. long, narrowly lanceolate. Lemmas 2-3 mm. long, chartaceous, bifid, awn arising from the sinus, up to 5 mm. long, slender, twisted, geniculate. Anthers 1-1.5 mm. long. Fl. 3-5.

Grassy places. *Malta* and *Gozo*: common (S. & C.G.; Borg; Kramer & Westra; Wolseley). *Comino*: (Borg).

Mediterranean Europe.

Tribe *Phalarideae* Kunth. Annuals or perennials. Leaves linear, flat. Inflorescence an ellipsoid or oblong panicle, sometimes lobed. Spikelets hermaphrodite (rarely the basal rudimentary). Spikelets 3-flowered, the lower 2 reduced, the upper hermaphrodite, strongly compressed. Glumes more or less equal, winged on the keels or wingless, lower lemma reduced, scalelike, the upper lemma coriaceous, dorsally rounded, compressed; stamens 3.

43. *Phalaris* L.

Annuals or perennials. Leaves flat. Panicle ellipsoid or oblong, sometimes lobed. Spikelets hermaphrodite (rarely rudimentary in the basal spikelets), strongly compressed, 3-flowered, the lower 2 florets reduced to the lemmas, the upper hermaphrodite. Glumes more or less equal, the lower lemma reduced to small scales, the upper lemma coriaceous, compressed. Stamens 3.

1. Perennial 50-180 cm. high
2. Annual, usually less than 50 cm. high

2. Lower nodes swollen
3. Lower nodes not swollen

3. Spikelets in fascicles of 5-7 with the centre one fertile and the rest sterile
4. Spikelets all fertile

4. Spikelets 4.5-5.5 mm. long; glumes winged on keel, wing with one or more teeth
5. Spikelets 6-10 mm. long; glumes winged on keel, wing entire

4. *tuberosa*
5. *caerulescens*

3. *paradoxa*

1. *minor*

2. *canariensis*

1. *P. minor* Retz.

Plate LXIII

Skalora salvagga
Lesser canary-grass

Slender annual 10-30 (100) cm. high. Culms caespitose, erect or geniculate, glabrous, smooth. Leaves up to 15 cm. long, linear, acuminate, more or less scabrid; sheaths smooth, the upper somewhat inflated; ligule up to 5 mm. long, laciniate. Panicle 1.5-2.5 mm. long, dense, ovoid to cylindrical. Spikelets 4.5-5.5 mm. long, compressed. Glumes firmly compressed, acute, winged on the keel, wing with one or more teeth. Sterile lemmas 2 (one minute), fertile lemma 3 mm. long, obovate, hairy. Anthers 1.5 mm. long. Fl. 3-6.

Cultivated and waste places and valleys. *Malta*, *Gozo* and *Comino*: very common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region; W. Asia.

2. *P. canariensis* L.

Skalora
Common Canary-grass

Annual 20-120 cm. high, solitary or caespitose. Culms erect or geniculately ascending, stiff, smooth. Leaves 5-25 cm. x 4-12 mm. lanceolate, flat, scabrid, ligules 3-8 mm. long. Panicle 1.5-6 x 1.2-2.2 cm., ovate, erect, dense, whitish with green nerves, branches short. Spikelets 6-10 mm. long, compressed, obovate, 1-flowered with 2 sterile florets. Glumes persistent, equal, as long as spikelet, ob-lanceolate, keeled, with the keel broadly winged above the middle, 3- to 5-nerved. Sterile lemmas 3-4.5 mm. long; fertile lemmas 5-6 mm. long, broadly elliptical, keeled, indurate, becoming smooth and glossy. Anthers 3-4 mm. long. $2n = 12$. Fl. 3-6.

Cultivated for seed for cage-birds. Malta and Gozo: cultivated and occasionally naturalised in waste places (Borg; G. Lanfranco; Wolseley).

Native of N. Africa and Macaronesia; introduced elsewhere.

3. *P. paradoxa* L.

Skalora
Mediterranean Canary-grass

Annual 20-50 cm. high. Culms fasciculate, geniculate at base, finally erect, glabrous. Leaves up to 15 cm. long, linear, acuminate, more or less glaucous; lower sheaths more or less scabrid, upper smooth, tubular. Panicle 3-4 cm. long, obovate or oblanceolate, rarely cylindrical, the base often enclosed in the uppermost spathe-like leaf-sheath. Spikelets 5-7 mm. long, usually in fascicles of 5-7, the central one fertile and sessile, the others sterile and pedicelled. Sterile spikelets more or less deformed or reduced at base of panicle, fertile spikelets compressed. Glumes 6-8 mm. long, lanceolate, acuminate, with a tooth-like wing from the middle of the dorsal keel, and aristate apex. Lemma 5-nerved, obovate. Anthers c. 1 mm. long. $2n = 14$. Fl. 3-6.

Cultivated and waste places. Malta, Gozo and Comino: common (S. & C.G.; Borg; G. Lanfranco; Haslam; Wolseley).

Mediterranean region; Canaries; introduced elsewhere.

4. *P. tuberosa* L.

Tuberous Canary grass

Perennial up to 180 cm. high, with a creeping woody rhizome. Culms fasciculate, decumbent or geniculate, finally erect, the lower nodes more or less swollen or dilated. Leaves up to 30 cm. x 4-7 mm., linear, acuminate, scabrid; ligule up to 8 mm. long. Panicle 2-6 x 1-1.5 cm., ovoid, cylindrical or compressed, dense. Spikelets 5-6 mm. long, strongly compressed. Glumes more or less equal, membranous with the dorsal keel winged, wing not denticulate. Sterile lemmas 1 or 2 if 2 then 1 minute; fertile lemmas 3.5-4 mm. long, hairy. Anthers 1.5 mm. long. Fl. 3-6.

Valleys and sheltered places. Malta: rare at Mtahleb, Marfa peninsula, Girdja, Wied ir-Rumi (S. & C.G.; Borg); Bahrija, Ghajn il-Kbira, Gnejna, Wardija (Borg). Mediterranean region; Canaries; introduced elsewhere.

5. *P. caerulea* Desf.
P. truncata sensu Borg

Bluish Canary-grass

Perennial 35-100 cm. high, usually bulbous at base, caespitose. Culms erect, smooth. Leaves 6-20 cm. x 2-3 mm., linear-lanceolate, flat; ligule 2-4 cm. long.

obtuse, with auricles at sheath margin. Panicle 3-10 x 1-2 cm., dense, cylindrical, green, sometimes purplish. Spikelets 5-8 mm. long, strongly compressed. Glumes more or less equal, membranous, ovate, acute, strongly keeled, with a membranous, denticulate wing in the upper 1/2. Lemmas thinly membranous, bifid at apex. Anthers 4-5 mm. long. Fl. 3-6.

Damp places. Malta: locally frequent (G. Lanfranco); Mtahleb, Wied ir-Rumi, Girdja, St. Paul's Bay (S. & C.G.; Borg); Wied Ballut (G.D.); Wardija, San Martin, Bahrija (Borg).

Mediterranean region; Macaronesia.

44. *Anthoxanthum* L.

Annuals or perennials smelling of coumarin. Panicle spike-like, more or less compact, ovoid or oblong. Spikelets lanceolate, compressed, of 2 sterile and 1 upper hermaphrodite floret. Glumes thin, the lower 1-nerved, the upper 3-nerved, longer than and enclosing floret. Sterile lemmas 3-nerved, awned from the dorsal surface; fertile lemma shorter, 5- to 7-nerved, awnless. Stamens 2.

Spike 4-6 cm. long; compact; spikelets 7-10 mm. long.

Spike 1.5-4 cm. long, lax; spikelets 9-12 mm. long.

1. *odoratum*
2. *gracile*

1. *A. odoratum* L.

Sweet Vernal-grass

Perennial 20-50 cm. high. Culms caespitose, erect, with 1-3 nodes. Leaves 1-12 cm. x 1.5-5 mm., flat, tapering to a fine point; ligule 1-5 mm. long, obtuse. Spike more or less compact, 1-12 x 0.6-1.5 cm.; branches short. Spikelets 6-10 mm. long, lanceolate, compressed, with 3 florets, the lower 2 sterile. Glumes persistent, unequal, the lower small, 1-veined, the upper as long as spikelet, 3-veined. Sterile lemmas 3-3.5 mm. long, brown, hirsute, 4- to 5-veined, awned from the base, the lower lemma shortly awned, the upper lemma with stout, geniculate awn 6-9 mm. long. Anthers 3-4.5 mm. long. $2n = 20$. Fl. 3-6.

Damp places. Malta: Marsa (Delicata; Borg).

Europe; N. Africa; N. & C. Asia; introduced in N. America.

2. *A. gracile* Biv.

Plate LXII

Slender Vernal-grass

Annual 10-30 cm. high. Culms solitary, erect or geniculately ascending, with 1-2 nodes. Leaves 2-10 x 0.3-0.5 cm., broadly lanceolate, flat, sparsely hairy or glabrous; ligule 2-4 mm. long, laciniate. Spike 1.5-4 x 0.75-2 cm., ovate, with spikelets loosely clustered. Spikelets 9-12 mm. long (excluding awns), ovate-lanceolate, with 2 sterile florets below and 1 fertile floret above. Glumes unequal, the upper 8-12 mm. long, 3-veined, the lower 4-6 mm. long, 1-veined, membranous and shining. Sterile lemmas 4-8 mm. long, brown, hirsute, with a stout, geniculate awn from the base up to 2 cm. long. Fertile lemma 3-4 mm. long, orbicular, shining brown. Anthers 2, c. 0.6 mm. long. Fl. 4-5.

Rocky sheltered places. Malta and Gozo: frequent in valleys (Borg; G. Lanfranco; Kramer & Westra).

Mediterranean region.

Tribe Arundineae Dumort. Perennial reed-like grasses. Leaves broad, linear, auriculate or rounded at the base, silica-bodies cross-shaped. Inflorescence a large

plumose panicle. Spikelets 2- to 10-flowered, laterally compressed, hermaphrodite or dioecious; axis disarticulating above the glumes and between the florets, sometimes pedicellate, with long hairs. Glumes hyaline or membranous, acuminate, persistent; lemmas 3-nerved, glabrous or dorsally long-hairy; stamens 3. Chromosomes small, basic number 12.

45. *Arundo* L.

Tall, stout perennials with culms hollow. Leaves flat, broad. Panicle large, plume-like, lower branches fasciated. Spikelets few-flowered, laterally compressed. Glumes persistent, more or less equal, membranous. Lemmas bifid, with short awn from the sinus, softly pilose. Palea 2-keeled, thickly ciliate on the keels. Stamens 3.

Plants 2-4 m. high; lemma bifid
Plants up to 1.5 m. high; lemma entire

1. *A. donax*
2. *A. plinii*

1. *A. donax* L.

Plate LXIV

Qasha
Great Reed

Perennial 2-4 m. high, with woody, knotty rhizomes. Culms simple or shortly branched from the nodes, smooth and glabrous. Leaves up to 60 x 6 cm, cordate at base; ligule reduced to a swollen ridge. Panicle 20-50 cm. long, in a plume-like spike, much branched. Lemmas bifid, with hairs as long as glumes, with a short awn in the sinus, 3-veined. Anthers c. 3 mm. long. Fl. 9-10.

Widely cultivated for the canes, and frequently naturalised in the valleys. *Malta*, *Gozo* and *Comino*; common everywhere (S. & C.G.; Borg; Haslam; Wolseley).

Mediterranean region; Asia; Polynesia; New Zealand; cultivated and naturalised elsewhere.

2. *A. plinii* Turra

Ghajun
False Reed

Differs from *A. donax* in the rhizome being less knotty; culms more slender, up to 150 cm. high; panicle 10-30 cm. long; lemma entire, acuminate, awned, with hairs, shorter than the glumes. Fl. 7-10.

Valleys. *Malta*: locally abundant at Gġgant, Ghajn il-Kbira (S. & C.G.; Borg; Wolseley); Buskett (S. & C.G.; Borg; Haslam).

W. & S. Europe; W. Asia; N. Africa.

46. *Phragmites* Adanson

Tall, stout perennials with creeping rhizomes. Leaves flat. Culms tall, hollow, reed-like. Panicles decompound, plume-like. Spikelets more or less laterally compressed, 2- to 10-flowered. Axis with long silky hairs. Glumes persistent, equal or unequal. Lowest lemma neuter or male, the other hermaphrodite, caudate-acuminate, surrounded by silky hairs. Stamens 3.

1. *P. australis* (Cav.) Trin. ex Steudal
P. communis Trin.

Plate LXIV

Qasbiot ir-riħ
Reed

Perennial up to 3 m. high, stoutly rhizomatous. Culms simple, rigid, smooth and glabrous. Leaves 20-60 cm. x 10-30 mm., tapering to a long filiform apex, tough, blades contracted at base; ligule of a dense fringe of short hairs. Panicles 15-40 cm. long, plume-like, erect or finally nodding, at first purplish or brownish, finally silvery, much branched; pedicels short. Spikelets 10-16 mm. long, lanceolate, widely gaping at maturity, 2- to 6-flowered, the lowest floret male, the others hermaphrodite. Glume smooth, 3- to 5-veined. Lowest lemma lanceolate, usually

3-veined, surrounded by fine silky hairs up to 9 mm. long from the axis. Anthers 1.5-2 mm. long. $2n = 48, 96$. Fl. 6-10.

Valley bottoms and moist places often in saline water. *Malta*: locally common (G. Ianfranco); Marsaxlokk, Marsaskala (S. & C.G.; Borg); Ghajn il-Kbira (G.D.; Borg; Wolseley); Għnien il-Kbir, Ghajn Tuffieħa, Salini (Borg); bays along N.W. coast of the island from St. Julian's to Mellieħa (Haslam). *Gozo*: Mgarr ix-Xini, Marsalforn (S. & C.G.; Borg; Wolseley); Dwejra (S. & C.G.; Borg; Wolseley).

Cosmopolitan, except for a few tropical regions and southern part of S. America.

47. *Ampelodesma* Beauv.

Perennials. Leaves involute. Inflorescence a panicle, more or less spike-like. Spikelets with 2-5 hermaphrodite florets. Glumes shorter than first floret; lower lemma with silky hairs at base and on the lower dorsal surface. Stamens 3.

1. *A. mauritanica* (Poiret) Dur. & Schinz

Mauritanian Grass

Perennial up to 1 m. high, caespitose, with creeping stem. Culms erect, solid, smooth and shining. Leaves 20-80 x 1-3 mm. when inrolled, linear, with long tapering apices; ligule up to 1 cm. long, smooth and shining on exposed surface. Scabrous along the margin, lacerate. Panicle 15-30 x 3-10 cm., unilateral, branches semi-whorled, spikelets on pedicels 3-10 mm. long. Spikelets 8-12 mm. long, 2- to 5-flowered, vari-coloured. Glumes mucronate, keeled, with scarious margins. Lower lemma keeled, bifid at apex; awn arising from the midrib, short. Upper lemma 2-keeled, bifid, more or less equal in length to lower lemma. Anther 4-7 mm. long. Fl. 4-6.

Humid valleys. *Malta*: rare at Wied Gerżuma (S. & C.G.; Borg).

W. Mediterranean region.

Tribe *Danthoniaceae* Nevski ex Zotov. Annuals or perennials. Leaves narrowly linear or setaceous; silica bodies rounded or dumbell-shaped; ligule a fringe of hairs. Inflorescence effuse or contracted panicles. Spikelets 2- to 10-flowered, all alike hermaphrodite. Glumes more or less equal, persistent, often hyaline on the margins; lemmas 5- to 11-veined, membranous or coriaceous; stamens 2. Chromosomes small, basic number 6, 9, 12.

48. *Schismus* Beauv.

Annuals. Leaves flat, involute or setaceous. Panicle spike-like, with spikelets shortly pedicelled. Spikelets with 5-10, hermaphrodite florets, or the uppermost reduced. Glumes persistent, subequal. Lemma bifid at the apex, awnless or with short awn. Stamens 2.

1. *S. arabicus* Nees
S. minutus Roemer et Schultes

Plate LXIII

Schismus-grass

Annual 6-15 cm. high. Culms solitary or caespitose, erect or geniculate ascending, with 1-2 nodes. Leaves 1-4 cm. x 0.5-2 mm., involute, more or less setaceous, glaucous-green; ligule a fringe of long white hairs. Spike 1-4 cm. long, of few to many spikelets on short pedicels. Spikelets 5-7 mm. long, laterally compressed, lanceolate, gaping. Glumes more or less as long as spikelet, lanceolate, strongly 5- to 7-veined, membranous. Lemma 3-4 mm. long, deeply bifid for

to $\frac{1}{2}$ of its length, shortly awned in the sinus, 9-veined, rounded dorsally with long white hairs on the lower part. Palea shorter than the lemma. Anthers c. 0.3 mm. long. Fl. 4-5.

Roadsides. *Malta*: very rare near Hamrun (Borg).

Mediterranean region; W. & C. Asia; introduced in S. Australia and N. America.

Tribe Stipeae Dumort. Annuals or perennials. Leaves narrow, usually convolute or folded; ligules membranous. Inflorescence an open or contracted panicle. Spikelets 1-flowered, all alike, hermaphrodite. Glumes 1-to 3-nerved, persistent, often translucent; lemma terete, becoming indurate, with convolute or involute margins, awned, with a curved, bearded, acute or sometimes obtuse callus; awn often geniculate and twisted, plumose or glabrous. Stamens 3. Chromosomes small, base numbers 9, 11, 12, 13-17.

49. *Stipa* L.

Perennials, or rarely annuals. Leaves convolute, sometimes flat. Panicle effuse or contracted. Spikelets 1-flowered, hermaphrodite. Glumes often several centimeters long, 1- to 3-veined. Lemma awned at the apex with long twisted awn. Stamens 3.

Glumes 1.5-2 cm. long; awns glabrous above 1. *capensis*
Glumes 3-6 cm. long; awns conspicuously long-hairy above 2. *pennata*

1. *S. capensis* Thunb.
S. tortilis Desf.

Plate LXIII

Common Awn-grass

Annual 12-40 cm. high, caespitose. Culms erect or geniculately ascending. Leaves 3-20 cm. x 1-2 mm., narrowly lanceolate, more or less setaceous, convolute, glaucous, glabrous; ligule reduced to a membranous ring; sheath more or less inflated, often enclosing the base of the panicle. Panicle 3-15 x 1-3 cm. (excluding awns), spike-like, of crowded silvery spikelets with awns twisted together to form an erect 'tail'. Spikelets 1.5-2 cm. long (excluding awn). Glumes unequal, the upper longer, 1.5-2 cm. long, lanceolate, chartaceous. Lemma 5-7 mm. long, hairy at base, closely convolute, indurate; awn 6-7 cm. long, arising from apex, short, hairy, twice geniculate, twisted below. Anthers c. 2.5 mm. long. Fl. 3-5.

Rocky, arid and cultivated places. *Malta*, *Gozo* and *Comino*: very common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Mediterranean region; S.W. Europe; W. & C. Asia; S. Africa.

2. *S. pennata* L.

Southern Awn-grass

Perennial 30-75 cm. high. Culms caespitose, with 0-2 nodes, erect, smooth, with conspicuous shining leaf sheaths remaining at base. Leaves 3-40 cm. x 1-2 mm., involute, setaceous, glaucous, glabrous, scabrid; ligule 1-4 mm. long, membranous, sheaths slightly inflated, uppermost enclosing the base of the panicle. Panicle 2-5 cm. long (excluding awns); awns conspicuous, long-hairy, up to 30 cm. long, making the whole spike appear feathery. Spikelets as long as glumes, narrow, lanceolate. Glumes unequal, lanceolate, attenuate, 2.5-6 cm. long, green to brown, with shining hyaline margins. Lemma 1.5-2 cm. long (excluding awn), densely hairy at base, closely convolute, indurate, awn arising from the apex, stout, 20-30 cm. long; twice geniculate, glabrous and twisted below, covered with white hair up to 5 mm. long above. Anthers c. 7 mm. long. Fl. 4-5.

And rocky places. *Malta*: Wied Incita (Delicata; Borg).

1. Europe; N. Africa; W. Asia.

50. *Oryzopsis* Michx.

Perennials. Leaves flat. Panicle effuse. Spikelets loosely aggregated or solitary, persistent, equal, acute or acuminate, the lower 5-nerved, the upper 3-nerved. Lemma coriaceous, lanceolate, acute, with a caducous awn at the apex. Stamens 3.

1. *O. miliacea* (L.) Ascherson & Schweinf.

Barrum

Milium multiflorum Cav.

Rice-grass

Perennial up to 1 m. high, more or less caespitose. Culms with 4-6 conspicuously dark nodes, erect or geniculately ascending, sometimes nodding. Leaves 4-32 x 3-7 cm., glabrous, glaucous, linear, acuminate, becoming involute; ligule obtuse, very short. Panicle 10-45 x 21 cm., contracted at first, finally effuse; branches verticillate, long, filiform, flexuous, minutely barbed. Spikelets 2-4 mm. long (without awn), ovate-lanceolate, 1-flowered. Glumes subequal, 2.5-4 mm. long, lanceolate, membranous. Lemmas ovate, acute, 3-veined; awn arising from the apex, straight, 1-5 mm. long. Anthers c. 1.4 mm. long. Fl. 5-7.

Rocky arid places and roadsides. *Malta*, *Gozo* and *Comino*: common everywhere (S. & C.G.; Borg; Wolseley).

Mediterranean region; Macaronesia; W. Asia; occasionally introduced elsewhere.

Tribe Aeluropodeae Nevski ex Bor. Perennials. Leaves often coriaceous, pungent, involute; silica-bodies dumbell or cross-shaped; ligule a ring of short hairs. Inflorescence of globular heads of spikelets or spaced in spikes along a vertical axis. Spikelets 6-to many-flowered, all alike, hermaphrodite, laterally compressed; silicles produced beyond the uppermost floret. Glumes unequal, the lower persistent, 2- to 3-veined, the upper 5-to 7-veined; lemmas 9-to 11-veined, longer than glumes, apiculate; stamens 3. Chromosomes small, base number 10.

51. *Aeluropus* Trin.

Perennials. Leaves folded, involute or convolute. Panicle dense, capitate, unilateral, with spikelets closely packed on axes. Spikelets sessile, with 4- to 18 hermaphrodite florets, laterally compressed. Glumes unequal, keeled, hyaline, mucronate. Lemmas keeled, mucronate subaristate. Stamens 3.

1. *A. lagopoides* (L.) Trin. ex Thw.

Plate LXIII

Perennial 3-15 cm. high, caespitose or with regularly branched creeping stolons; occasionally rhizomatous. Culms erect or geniculate at base, glaucous. Leaves 2-3 cm. x 1.5-3 mm., narrowed to a hooded apex, rigid, more or less distichously arranged, leaves and sheaths long hairy, pungent, glaucous; ligule a ring of hairs. Panicle 5-15 x 6-8 mm., dense, globular or oblong, conspicuously long-hairy, made up of axes of spikelets and/or individual spikelets. Spikelets 3-4 mm. long, 4-flowered. Glumes ovate, acute, mucronate and denticulate at apex, long-hairy on the dorsal surface, the lower smaller, 3-veined, the upper c. 2 mm. long. Lemmas c. 2 mm. long, broadly ovate, subaristate and denticulate at apex, 9- to 11-veined, keeled, ciliate on the keels. Anthers c. 1 mm. long. Fl. 4-10.

And coastal places. *Malta*: Qalet Marku (Silverwood). *Gozo*: Dwejra (Wolseley).

1. & E. Mediterranean region; W. & C. Asia.

Tribe Eragrostideae Stapf. Annuals or perennials, often glandular, glands sunken pits, patches or dots; silica-bodies saddle-shaped. Ligule usually a fringe of hairs. Inflorescence in open or contracted panicles, or sessile in panicle spikelets. Spikelets 2- to many flowered, hermaphrodite, usually firmly laterally compressed, pedicelled. Glumes shorter than lemmas; stamens 2 or 3. Chromosomes small, base numbers 9, 10.

52. Eragrostis Beauv.

Annuals or perennials. Leaves narrow, linear. Panicles effuse (rarely spike-like). Spikelets laterally compressed, 2- to many-flowered; glumes unequal or subequal, lemmas 3-veined, more or less overlapping, keeled, glabrous or ciliate on the margins and/or keel; stamens 2-3.

1. *E. ciliaris* (All.) Vign.-Lut.
E. megastachya (Koel.) Link

Plate LXV

Stink-grass

Annual up to 60 cm. high. Culms fasciculate, erect or geniculate, simple or branched, smooth and glabrous. Leaves up to 15 cm. x 4 mm., linear-lanceolate, glaucous, glandular on the margins and midrib; ligule reduced, ciliate on the margins. Panicle up to 15 x 4 cm., dense, steel-grey. Spikelets crowded, subspike-like. Glumes oval, acuminate. Lemmas broad, often glandular on the keels. Fl. 5-9.

Weed of irrigated gardens or crops. Malta: occasional (Borg); San Martin (Silverwood).

Europe; Asia; N. Africa; introduced elsewhere.

Tribe Chlorideae Agardh. Annuals or perennials. Leaves linear; silica-bodies saddle-shaped; ligule a row of hairs or membranous. Inflorescence of spikelets arranged in one or two rows in the continuous axis of solitary, digitate or scattered spikes or spike-like racemes. Spikelets 1- to several-flowered, compressed laterally with 1 or 2 florets, hermaphrodite. Glumes unequal; lemma 1-3-veined, more or less hairy; stamens 3. Chromosomes small, base numbers 9, 10.

53. Cynodon Rich

Perennials with creeping stolons and/or rhizomes. Leaves short, narrow. Inflorescence of 4-6 unilateral spikes, digitately arranged. Spikelets laterally compressed, biserial, unilateral on the axis, 1-flowered. Glumes more or less equal, thin, keeled. Lemmas longer and broader than glumes. Stamens 3.

1. *C. dactylon* (L.) Pers.

Plate LXV

Nigem

Bermuda-grass

Perennial 8-30 cm. high, mat-forming with creeping stolons and scaly rhizomes, profusely branched. Culms erect or geniculate, smooth. Leaves 2-15 cm. x 2-4 mm., borne on short leafy shoots or flowering culms, margins converging to an obtuse apex; ligule a dense rim of short hairs. Spikes 3-6, terminal, 2-5 cm. x 1-1.5 mm. Spikelets 2-2.8 mm. long, sessile; appressed to the rachis, 1-flowered. Glumes persistent, more or less equal, linear, acuminate, 1-veined. Lemmas obtuse, keeled, 3-nerved, densely pubescent on the keel and often near the margins. Anthers up to 1.5 mm. long. $2n = 36$. Fl. 4-11.

Cultivated and waste places; a persistent weed of irrigated orchards and gardens.

Malta, Gozo and Comino: common everywhere (S. & C.G.; Borg; Haslam; G. Lanfranco; Wolseley).

Tropical and warmer temperate regions of the world; widely introduced.

Tribe Sporoboleae Stapf. Annuals or perennials. Leaves linear; silica-bodies saddle-shaped; ligule a rim of hairs. Inflorescence an open or contracted, sometimes spike-like panicle. Spikelets all alike, hermaphrodite, terete, gaping, 1-flowered. Glumes equal or unequal, more or less persistent, nerveless or 1-veined; lemmas 1- to

3-nerved, usually shining; stamens 3 or 2. Chromosomes small, base numbers 9, 10, 12 or 6.

54. Sporobolus R. Br.

Annuals or perennials. Panicle open or contracted and spike-like. Spikelets 1-flowered, hermaphrodite. Glumes more or less persistent, membranous, equal or unequal, nerveless or 1-nerved; lemma 1- to 3-nerved, membranous, shining. Stamens 3 or 2.

1. *S. arenarius* Duv.-Jouve

Plate LXV

Sand Dropseed

Perennial 10-25 cm. high with long horizontal rhizomes. Culms pungent, upright, branched, frequently buried below sand, erect, smooth, with 5-6 nodes. Leaves 2-12 x 0.2-0.5 cm., glaucous, lanceolate, rigid, convolute at apex, closely sheathous; ligule a fringe of hairs; sheath striate, keeled so that the culm appears compressed. Panicle 2.5-6 x 1-2 cm., ovate, acute, frequently partly enclosed in the uppermost leaf-sheath. Branches stout and erect; pedicels slightly swollen below spikelet. Spikelet 3-4 mm. long, gaping, 1-flowered. Glumes unequal, chartaceous, the upper 3-4 mm. long, broadly ovate, acute, the lower 1.5-2.5 mm. long, narrowly lanceolate. Lemma 3-4 mm. long, chartaceous, ovate, strongly 1-veined, exserted as a mucronate tip. Anthers 1.5-2 mm. Fl. 8-9.

Sandy maritime areas. Malta: not common (G. Lanfranco); Marfa (S. & C.G.; Borg); Mellieha Bay, St. Paul's Bay (S. & C.G.; Borg; Wolseley); Bugibba (Borg). Gozo: Ramla (S. & C.G.; Borg; Wolseley); Marsalforn, Qbajjar (Borg). Comino: Sta. Marija (Borg; Wolseley).

Mediterranean region; Cape Verde Islands.

Tribe Paniceae R. Br. Annuals or perennials, sometimes woody. Leaves usually flat; silica-bodies nodular, dumbbell- or cross-shaped; ligule membranous, a row of hairs, or rarely absent. Spikelets usually similar, hermaphrodite, usually deciduous from the pedicels at maturity, 2-flowered, the lower male or barren, the upper hermaphrodite. Glumes usually unequal, the lower small, rarely absent, the upper as long as (or shorter than) the spikelet; lemmas dissimilar, the upper, smooth or rugose, awnless or with a short mucro; stamens 3. Chromosomes small, base numbers 7, 9, 10, 15, 17, 19.

55. Crypsis Aiton

Annuals. Culms prostrate, finally erect. Leaves flat. Inflorescence a compound spike of globose capitula formed by closely clustered spikelets, more or less enclosed by the subtending sheaths. Spikelets 1-flowered, hermaphrodite, laterally compressed. Glumes persistent, more or less equal, complicate, compressed. Lemma acutely keeled, 1-nerved. Stamens 2-3.

1. *C. aculeata* (L.) Aiton

Plate LXV

Pricklegrass

Annual 3-20 cm. high, tufted. Culms smooth, glabrous. Leaves 5 cm. mm., linear, acuminate, glaucous, hairy on both surfaces; ligule ciliate. Capitulum broader than long, supported by 2 opposite, inflated, short sheaths, bearing pungent laminae. Spikelets sessile. Glumes ciliate near the apex. Lemmas 4 mm. long, longer than the glumes. Anthers c. 1 mm. long. Fl. 6-9.

Maritime places where water accumulates in winter. *Malta*: Ghadira is-Safra between Baħar iċ-Ġuħaq and Salini. (Borg; E. & G. Lanfranco).

C. & S. Europe; W. & C. Asia, N. Africa; introduced in S. Africa.

56. *Digitaria* Heist. ex Fabr.

Annuals or perennials. Leaves narrow, flat, more or less soft. Inflorescence (2-)4-10 spike-like racemes arranged in pairs or subdigitately, more or less, whole rachis flattened or triquetrous, often winged. Spikelets in pairs, unilateral, pedicelled, 1- to 2-flowered, all alike or dimorphic. Glumes unequal, the lower minute, hyaline or absent, the upper rarely as long as the spikelet, narrow, rarely absent. Lower lemma 5- to 7-veined. Stamens 3.

1. *D. sanguinalis* (L.) Scop.

Plate LXV

Hairy Finger-grass

Annual 10-30 (-60) cm. high. Culms erect or geniculate at base, with 3-8 nodes. Leaves 3-5 cm. x 3-8(-14) mm., narrowly lanceolate, hairy to glabrous, scabrid on the margins; sheaths covered with dense tubercle-based hairs; ligules 1-2 mm. long, obtuse. Racemes 4-10, spreading, arising at apex of culm or in 2 whorls, 4-5 cm. long; rachis triquetrous, scabrid on the angles. Spikelets 2.5-3 mm. long, unequally short-pedicelled, falling entire at maturity, 1-flowered. Lower lemma minute, the upper up to 1/2 as long as the spikelet, 3-veined. Lower lemma as long as spikelet, 7-veined with glassy scabridities on nerves near the apex; the upper lemma acute. Anthers c. 0.6 mm. long. $2n = 36$. Fl. 8-11.

Damp places; occurs mostly as a weed of lawns and cultivated areas. *Malta*: occasional at Attard, San Martin, Mtahleb, Żurrieq (S. & C.G.); Marsa (Wolseley); Sliema (E. Lanfranco). *Gozo*: occasional (S. & C.G.).

Warm and temperate regions throughout the world.

57. *Echinochloa* Beauv.

Annuals or perennials. Leaves flat, often flaccid. Panicle made up of racemes of spikelets in false spikes. Spikelets sessile or pedicelled, 2-flowered. Glumes unequal, the lower much smaller, mucronate, the upper as long as the lower, mucronate or short-awned. Lower lemma similar to upper glume, awned, without a male flower, the upper lemma enclosing a hermaphrodite flower, involute margins clasping the palea. Stamens 3.

Spikelets 2-3 mm. long; glumes and lemmas not awned or cuspidate

Spikelets 3-4 mm. long; glumes cuspidate or acuminate; lower lemmas usually awned

1. *colonum*

2. *crus-galli*

2. *E. colonum* (L.) Link.

Plate LXV

Xrika

Panicum crus-galli var. *colonum* L.

Millet-grass

Annual 20-40 cm. high, solitary or caespitose. Culms erect or decumbent, all ending at the base, more or less succulent. Leaves 4-20 cm. x 3-10 mm., lanceolate, acuminate, glabrous; ligule absent. Panicle 4-14 cm. x up to 1.5 cm., a raceme of racemes spread along the rachis; racemes 1-3 cm. long, appressed or spreading. Spikelets 2-3 mm. long, more or less sessile, ovate, acute, falling entire at maturity. Glumes unequal, the upper larger, up to 1/2 the length of the spikelet. Lemmas ovate, hairy on dorsal surface, the upper smooth, ovate. Anthers up to 1 mm. long. Fl. 6-10.

Damp places, irrigated ground. *Malta*: infrequent (G. Lanfranco); Ġirgenti, Mtahleb, Żurrieq, Buskett, Bahrija, Gnien il-Kbir, San Martin, Pwales, Mellieħa, Gnien il-Misra, Mistra, Seimun (Borg).

Mediterranean region; Asia; Canaries; tropical and S. Africa; N. and tropical America; Australia; introduced elsewhere.

3. *E. crus-galli* (L.) Beauv.

Xrika

Panicum crus-galli L.

Cockspur

Annual 30-120 cm. high. Culms more or less erect, stout, usually branched, smooth. Leaves 6-35 cm. x 8-20 mm., lanceolate, acuminate, soft, scabrid on the flattened margins; ligules absent. Panicles 6-20 x 2-8 cm., with few-many spikelets, racemes spaced or clustered along the rachis; racemes dense, up to 6 cm. long, unilateral, their axes tough; pedicels 0.5-2 mm. long. Spikelets 3-4 mm. long (long awns), ovate, acute or awned with 2 florets, the lower barren, the upper hermaphrodite. Glumes unequal the upper larger, equalling spikelet, with short spiny hairs on the dorsal surface. Lower lemma flattened, abruptly narrowed at short cusp or awn up to 5 cm. long with spiny hairs on the veins of the dorsal surface and on the awn. Upper lemma smooth, yellowish, dorsally rounded. Anthers 1 mm. long. Fl. 6-10.

Damp places, irrigated ground. *Malta*: rare (G. Lanfranco); Mtahleb, Bahrija, Buskett (Borg).

Warmer regions of the earth; introduced in many places for fodder.

58. *Panicum* L.

Annuals or perennials. Leaves flat. Panicle contracted or effuse. Spikelets pedicelled, 2-flowered, falling entire. Glumes caducous, unequal, lower smaller than the upper. Lower lemma similar to upper glume, with or without a male flower; upper lemma coriaceous, margins involute with a hermaphrodite flower. Stamens 3.

1. *repens* L.

Plate LXV

Creeping Panic-grass

Perennial up to 60 cm. high, spreading rhizomatously. Culms erect, smooth, arising from nodes on rhizome. Leaves 3-40 cm. x 3-6 mm., distichously arranged, lanceolate, more or less hairy on sheath and leaf-surfaces, densely hairy on the lower part frequently enclosed by upper leaf-sheath; branches ascending, more or less flexuous, with spikelet borne singly on short pedicels. Spikelets c. 2.5 mm. long, elliptical, acute. Lower glumes more or less orbicular, cup-shaped around

the spikelet, the upper glume ovate, acute, equal in size to spikelet. Lemma similar to upper glume. Anthers 1-2 mm. long, bright orange; stigmas feathery, purple. Fl. 6-11.

Damp places, valleys and irrigated ground. *Malta*: locally frequent (G. Lanfranco); Gircnti, Fiddien, Mtahleb, Buskett Gniel il-Kbir, San Martin (S. & C.G.; Borg; Wolseley); Mellieha, Gniel Ingraw, Marfa (Borg); Wardija (Borg; Wolseley); Wied ta' l-Isperanza (Wolseley). *Gozo*: Mgarr (S. & C.G.; Borg); Ghajnsiela, San Blas, Wied il-Lunzjata (Borg; Wolseley); Wied il-Qasab (Gulla; Borg); Pefra (Wolseley).

Mediterranean region; Asia; Macaronesia; Australia; tropical Africa; southern America.

59. *Paspalum* L.

Annuals or perennials. Leaves linear, flat. Inflorescence of solitary, digitate or racemously arranged spikes; axis of the raceme flat, sometimes winged. Spikelets unilateral, 2 or 4-seriate, solitary or paired, 2-flowered. Glumes markedly unequal. Lower lemma sterile, upper fertile. Stamens 3; lodicules 2.

1. *P. dilatatum* Poiret

Plate LXVI

Golden Crown-grass

Perennial up to 1 m. high, caespitose with stout rhizomes. Culms succulent, erect or geniculately ascending. Leaves up to 25 cm. x 10 mm., linear-lanceolate, ligule membranous, with a tuft of long white hairs; sheaths enclosing culm and part of inflorescence, loosely imbricate. Racemes spreading, 6-8 cm. x 10 mm., axis flattened and winged, more or less purplish, with numerous, shortly pedicelled spikelets. Spikelets 3-3.5 mm. long, broadly ovate, acute. Upper glume as long as the spikelet, long-ciliate on the margins with silky white hairs, the lower glume if present scale-like. Sterile lemma similar to upper glume, the fertile lemma chartaceous, with involute margins. Anthers c. 1 mm. long; stigmas dark purple. Grain orbicular, plano-convex. Fl. 5-6.

Irrigated places. *Malta*: frequent along the Marsa water course (Wolseley).

Native of S. America; introduced to many parts of the Old World.

60. *Setaria* Beauv.

Annuals or perennials. Leaves flat or plicate. Inflorescence spike-like, dense to somewhat effuse and lobed. Spikelets supported by 1-several, yellowish or reddish-persistent bristles, with 2 florets, the lower male, the upper hermaphrodite, falling entire at maturity. Glumes unequal. Stamens 3; lodicules 2.

1. Spikelets 3 mm. long; upper glume shorter than the upper lemma

Spikelets 2-2.5 mm. long; upper glume as long as the upper lemma

2. Bristles with retrorse hooks
Bristles with forwardly-directed barbs

3. Inflorescence 2-3 cm. wide, lobed
Inflorescence 4-10 mm. wide, cylindrical

1. *lutescens*

3. *verticillata*

2. *italica*

4. *viridis*

1. *S. lutescens* (Weigel) Hubbard. *S. glauca* auct.

Yellow Bristle-grass

Annual 6-75 cm. high, solitary or loosely caespitose. Culms erect or geniculately ascending, slender, with 2-4 nodes. Leaves 6-30 cm. x 4-10 mm., linear-lanceolate, glabrous or hairy towards base; ligule a dense fringe of hairs; sheaths smooth, the lower compressed, keeled. Panicle spike-like, dense, 1-14 cm. x 4-8 mm.; branches up to 1 mm. long, pedicels with 5-10 bristles, bearing a single spikelet; bristles fine, scabrid, up to 10 mm. long, yellowish to reddish-yellow. Spikelets c. 3 mm. long, broadly elliptical, 1. to 2-flowered. Glumes broadly ovate, thinly membranous, the lower up to $\frac{1}{2}$ as long as spikelet, 3-veined, the upper $\frac{1}{2}$ as long as spikelet, 5-veined. Lower and upper lemmas as long as spikelet, the upper broadly boat-shaped, dorsally rounded, prominently transversely wrinkled, tough, rigid, becoming yellow or brown. Anthers up to 1.5 mm. long. $2n = 18, 36$

Irrigated places. *Malta*: rare at Balzan, Lija, Birkirkara (Borg).

Widespread in the warmer regions of the earth.

2. *S. italica* (L.) Beauv.

Italian Bristle-grass

Annuals up to 150 cm. high, robust. Culms stout, sheathed, glabrous, erect or geniculately ascending. Leaves up to 45 x 2 cm., flat, flaccid, glabrous. Inflorescence spike-like, erect or drooping. Spikelets clustered into groups of 2-4 and arranged in compound groups, giving the inflorescence a lobed appearance; bristles few, shorter than or equal to the mature spikelet, scabrid. Spikelets 2-3 mm. long. Upper glume as long as the smooth upper lemma. Fertile floret becoming detached from spikelet at maturity. $2n = 18$, Fl. 6-10.

Malta: recorded at Mtahleb, but not found again (Borg).

Cultivated widely in C. & E. Mediterranean region; Asia; W. & S. Africa; Macaronesia; Australia; America.

3. *S. verticillata* (L.) Beauv.

Plate LXVI

Xrika

S. italica var. *verticillata* (Beauv.) Fiori

Rough Bristle-grass

Annual up to 90 cm. high, densely caespitose. Culms erect or geniculately ascending, with 1-3 nodes. Leaves up to 18 x 1.2 cm., broadly lanceolate, flat, flaccid, hairy or glabrous, scabrid; ligule a fringe of short hairs; sheaths compressed, keeled. Panicle 4-8 x 0.5-1.2 cm., at first cylindrical, dense, bristly, at maturity untidily lobed, straight, curved or twisted, with short stout branches bearing retrorse hooks. Spikelets c. 2 mm. long, often solitary, bristles 1-several, 5-8 mm. long. Glumes thinly membranous, lower up to $\frac{1}{2}$ as long as spikelet, ovate, 1 to 3-veined, the upper as long as spikelet, 5- to 7-veined. Lower lemma resembling upper glume, the upper as long as spikelet, elliptical-oblong, becoming tough and rigid, very finely wrinkled. Anthers 0.7-0.8 mm. long. $2n = 18, 36$. Fl. 5-10.

Irrigated ground, often a troublesome weed. *Malta*, *Gozo* and *Comino*: common (S. & C.G.; Borg; G. Lanfranco; Wolseley).

Widespread in the warmer regions of the earth.

4. *S. viridis* (L.) Beauv.
S. italica var. *viridis* (Beauv.) Fiori

Green Bristle-grass

Annual 10-60 cm. high, loosely caespitose. Culms erect or geniculately ascending, with 3-5 nodes. Leaves 3-30 cm. x 4-10 mm., lanceolate, tapering to a point, glabrous; ligules a dense fringe of hairs; sheaths terete, hairy on the margins. Panicles spike-like, dense, cylindrical, 1-10 cm. x 4-10 mm.; branched up to 3 mm. long; bristles 1-3 beneath each spikelet, up to 10 mm. long, scabrous. Spikelets 2-3 mm. long, elliptical-oblong, 1-flowered. Glumes thinly membranous, the lower up to $\frac{1}{2}$ as long as spikelet, ovate, 1- to 3-veined, the upper as long as spikelet, 5- to 7-veined. Lower lemma resembling upper glume, the upper as long as spikelet, elliptical-oblong, becoming tough, rigid, very finely wrinkled. Anthers 0.8 mm. long. $2n = 18$, Fl. 5-10.

Gardens and irrigated ground. *Malta*: Balzan, Lija, Birkirkara, Hamrun, San Anton, Għajet il-Kbir, Mtaħleb, Gnejna, Għajn Tuffieħa, Mellieħa (Borg).

Europe except the north; Asia; N. Africa; introduced elsewhere.

Tribe *Andropogoneae* Dumort. Annual or perennial. Leaves flat; silica-bodies dumbbell shaped; ligule membranous, with or without ciliate rim. Inflorescence panicle or a raceme with a tough or fragile axis. Spikelets usually paired, sessile, 1 pedicelled, the sessile spikelet 2-flowered, with lower floret male or barren and the upper hermaphrodite or rarely female, the pedicelled spikelet 1-flowered, male or empty, deciduous from the pedicels at maturity, rachis usually breaking up. Glumes more or less equal; lemmas with a stout geniculate awn. Chromosomes small, base numbers 5,9-15, 17, 19.

61. *Hyparrhenia* Anderss.

Annuals or perennials. Leaves flat. Panicle spathate, of few to many raceme panicles terminating a peduncle and included in a spatheole; spikelets arranged on a fragile axis, 2-flowered. Glumes equal. Lemma of hermaphrodite flower bifid, with a stout geniculate awn, other lemmas awnless. Stamens 3.

1. *H. hirta* (L.) Stapf.
Andropogon hirtus L.

Plate LXVI

Perennial 50-80 cm. high, densely caespitose. Culms erect, smooth, with 5-10 nodes. Leaves 10-25 cm. x 2-4 mm., scabrid, glaucous-green to reddish, linear, tapering to an acute point or withered, folded near apex; ligule 2-3 mm. long, acute, becoming laciniate. Panicle 10-20 cm. long, effuse, lax, leafy, irregular branches 1-6, arising in the axil of leaves of the upper 2-4 nodes, long-hairy. The peduncles of the pairs of spike-like racemes; racemes 2-3 cm. long, slightly divergent. Spikelets of 2 types, 1 sessile, hermaphrodite and 1 pedicelled, male. Sessile spikelet 2-flowered, with lower floret male or barren and the upper hermaphrodite or rarely female, the pedicelled spikelet 1-flowered, male or empty, deciduous from the pedicels at maturity, rachis usually breaking up. Glumes more or less equal; lemmas with a stout geniculate awn. Chromosomes small, base numbers 5,9-15, 17, 19.

Rocky valleys, *Malta*, *Gozo* and *Comino*: common (Borg; G. Lanfranco; Wolseley). W. & S. Europe; N. Africa; Macaronesia; C. & W. Asia; S. Africa; Australia.

62. *Sorghum* (L.) Moench

Annuals or perennials. Culms stout, erect. Leaves flat. Inflorescence a panicle of few to many pairs of spikelets, one sessile and one pedicelled. Spikelets with 2 florets; the upper hermaphrodite, the lower sterile in the sessile spikelet, pedicelled spikelet male or neuter. Glumes equal. Lemmas awnless or with geniculate awn. Stamens 3.

Panicle glomerate, ovoid, with erect branches of ovate to globose spikelets

Panicle pyramidal with widely spreading branches, of lanceolate to narrowly ovate spikelets

1. *bicolor*

2. *halepense*

S. bicolor (L.) Moench
S. vulgare Pers.

Qarabocē
 Millet

Annual up to 4 m. high, solitary or caespitose. Culms smooth and glabrous, often sweet when chewed. Leaves 30-60 x 5-8 cm., linear, acuminate; ligule a short fringe of hairs. Panicle loose or dense, erect or nodding. Sessile spikelets 5-7 mm. long, without awn, ovate to subglobose, tawny-yellow, orange, red or black; glume as long as spikelet, becoming indurated, ovate, acute, hairy at least on the margins; lemma bifid at apex, awn arising from lower $\frac{1}{2}$, stout, geniculate, twisted, c. 11 cm. long. Pedicellate spikelets 4-6 mm. long, ovate-lanceolate; glumes as long as spikelet, membranous; lemma awnless. Anthers 2-3 mm. long. Fl. 6-10.

Malta and *Gozo*: cultivated mainly as green fodder (Borg).

Cultivated in Mediterranean; W. & C. Asia and Tropical Asia.

1. *S. halepense* (L.) Pers

Plate LXVI

Aleppo Millet

Perennial 85-150 cm. high, usually solitary. Culms erect, stout, smooth and shining, with 3-5 nodes. Leaves 15-100 x 0.5-3 cm., broad, tapering to an acute, often withered point, smooth, flat, with stout mid-vein; auricled at junction of lemma with sheath; ligule a fringe of hairs. Panicle 16-40 x 2-10 cm., with erect, pedicellate branches. Spikelets in pairs. Sessile spikelet 4.5-5.5 mm. long, without awn, ovate-lanceolate, acute; glumes as long as spikelet, coriaceous, shining, sparsely hairy, toothed at apex; lemma bifid at apex; awn arising from the sinus, stout, twisted, geniculate, up to 2 cm. long. Pedicellate spikelets 5-7 mm. long, awnless, lanceolate; glumes as long as spikelet, membranous, shortly hairy on the margins. Anthers c. 2.5 mm. long. Fl. 5-10.

Cultivated and damper waste places. *Malta*: local (G. Lanfranco); Mtaħleb, Gnejna, Għajet il-Kbir, C.G.; Borg; Wolseley; San Martin, Pwales (S. & C.G.; Borg); Buskett, Mellieħa (Borg); St. Paul's Bay (Wolseley); Victory Church on Rabat road (Gauci).

Mediterranean region; Asia; Africa; introduced elsewhere.

Tribe *Maydeae* Dumort. Annuals or perennials. Leaves linear, often broad, rounded at the base; silica-bodies dumbbell or cross-shaped. Spikelets unisexual, dissimilar, dioecious in different inflorescences (*Zea*) or in the same inflorescence. Male spikelets 2-flowered; glumes more or less equal; stamens 3. Female spikelets 1-flowered (lower floret barren), solitary or sometimes paired, crowded in rows on a thick spongy axis (*Zea*) or sunk in cavities of a fragile rachis, or three-flowered and enclosed in a bony involucre. Chromosomes medium; base numbers 14.

63. *Zea* L.

Annuals. Leaves broad, flat, pendulous. Inflorescence monoecious. Male inflorescence of numerous spike-like racemes, forming spreading panicles terminating the shoots; stamens 3. Female inflorescence axillary, sheathed with spikelets arranged in rows on a thick spongy central rachis.

1. *Z. mays* L.

Qamh ir-rum
Maize

Annual 50-200 cm. high, solitary. Culms robust, erect. Leaves up to 90 x 10 cm., linear, acuminate, with sinuate margins; ligule short, ciliate. Male panicle with spreading spike-like racemes, spikelets in pairs, 2-flowered, subsessile, the other pedicellate; glumes equal, membranous. Female inflorescence with long drooping styles, spikelets in pairs in rows on the axis, 2-flowered, the lower fertile, the upper sterile; glumes subequal, fleshy below, hyaline above. Grain cuneate, flattened above.

Malta and Gozo: occasionally cultivated (Borg).

Widely cultivated in most tropical and subtropical regions.

Coix lachryma-jobi L. is cultivated for ornament and occasionally naturalised (Borg).

Tribe Lygaeae Lange Rhizomatous perennials. Leaves involute. Inflorescence enclosed in a broad spathe-like bract; spikelets 2-3, fused at base into a tube, tube covered with long silky hairs becoming hard in fruit.

64. *Lygeum* L.

Characters of the genus are the same as the tribe.

1. *L. spartum* L.

Plate LXVI

Halfa
Esparto grass

Perennial 20-60 cm. high, with a creeping rhizome. Culms crowded, erect, caespitose. Leaves 2-45 cm. x 0.7-2.0 mm., involute, linear, curved, with sharp apex; ligule 6-10 mm. long, bifid for more than 1/2 its length. Inflorescence terminal, bract enclosing spikelets 4-6 cm. x 4-10 mm., ovate-lanceolate. Spikelets fused into a tube at base, the whole being subequal to the bract in length, hairs on tube up to 1 cm. long, silky; lemmas membranous, lanceolate, up to 3 cm. long. Anthers 20-30 mm. long. Fl. 2-6.

Mainly on clay slopes near the sea. Malta: locally frequent (G. Lanfranco); Mtaħ-leb, Salini (S. & C.G.; Borg); Gnejna, St. Paul's Bay; Il-Fawwara (S. & C.G.; Borg; Wolseley); Ghajn Tuffieħa, Fomm ir-Riħ (Borg; Haslam; Wolseley). Gozo: Wied il-Ghasri (S. & C.G.; Borg); Xlendi (Duthie; Borg); Nadur, Mgarr (Borg; Wolseley).

Mediterranean region.

Selaginella denticulata

Isoetes hirsuta

Asplenium marinum

Anogramma leptophyllum

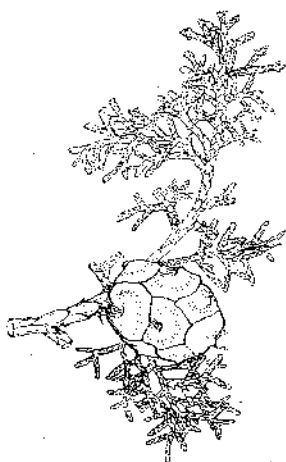
Prorhinanthus aspidium

Phyllitis sagittata

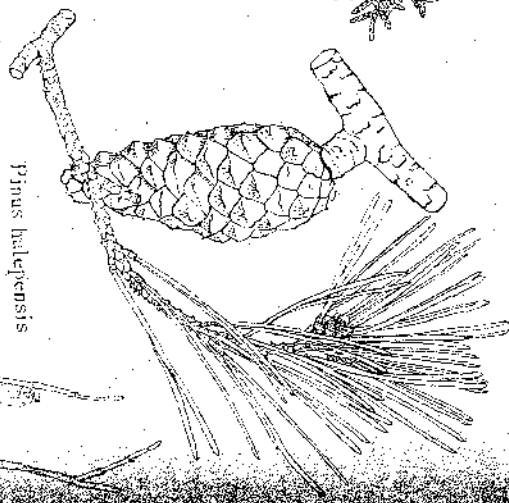
Ceterach officinarum

Adiantum capillus-veneris

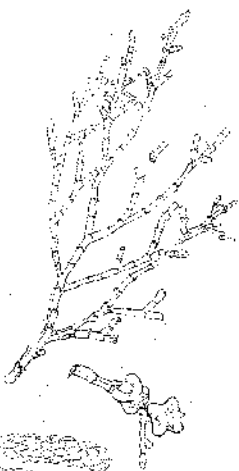
Equisetum telmateium



Cupressus sempervirens



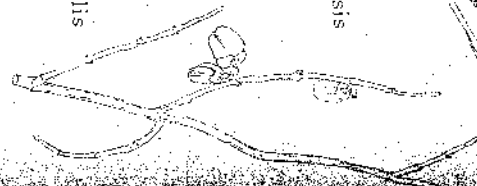
Pinus halepensis



Tetradleus articulata



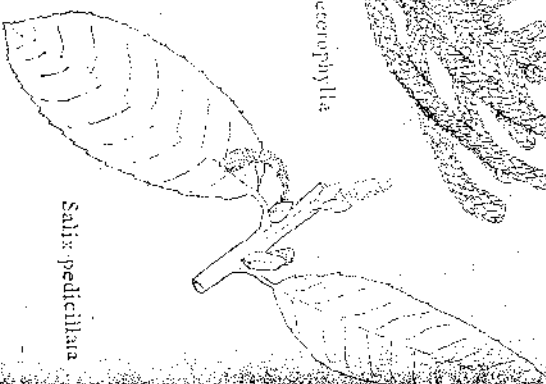
Aruncaria heterophylla



Ephedra fragilis



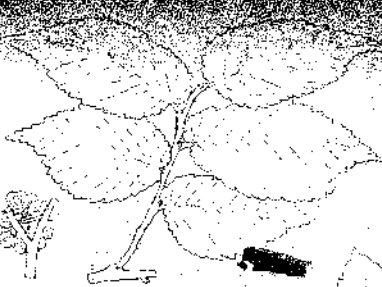
Populus alba



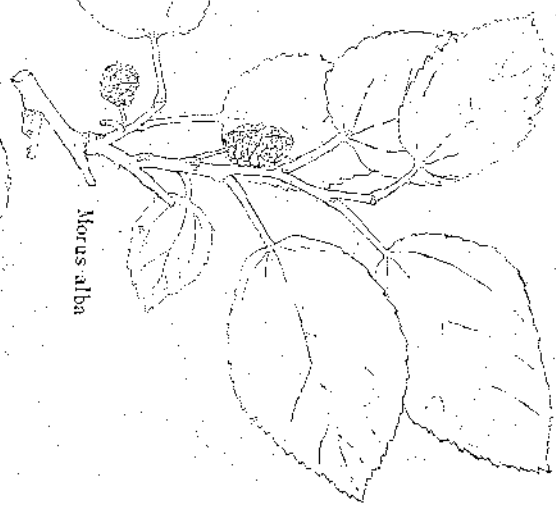
Salix pedicellata



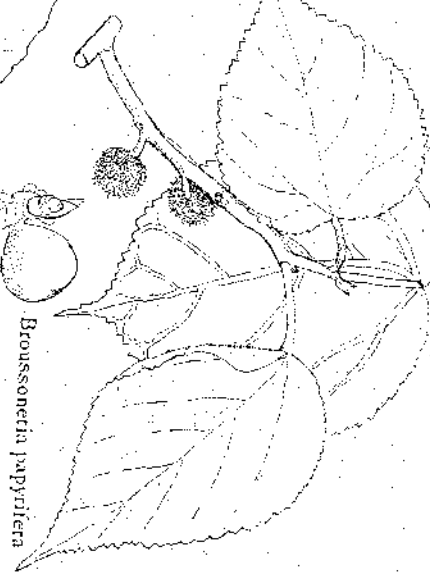
Quercus ilex



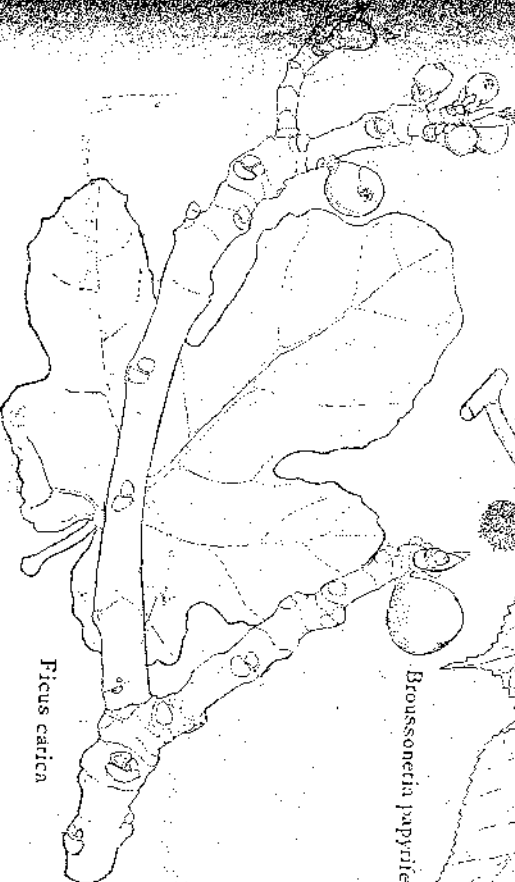
Ulmus canescens



Morus alba



Broussonetia papyrifera



Ficus carica

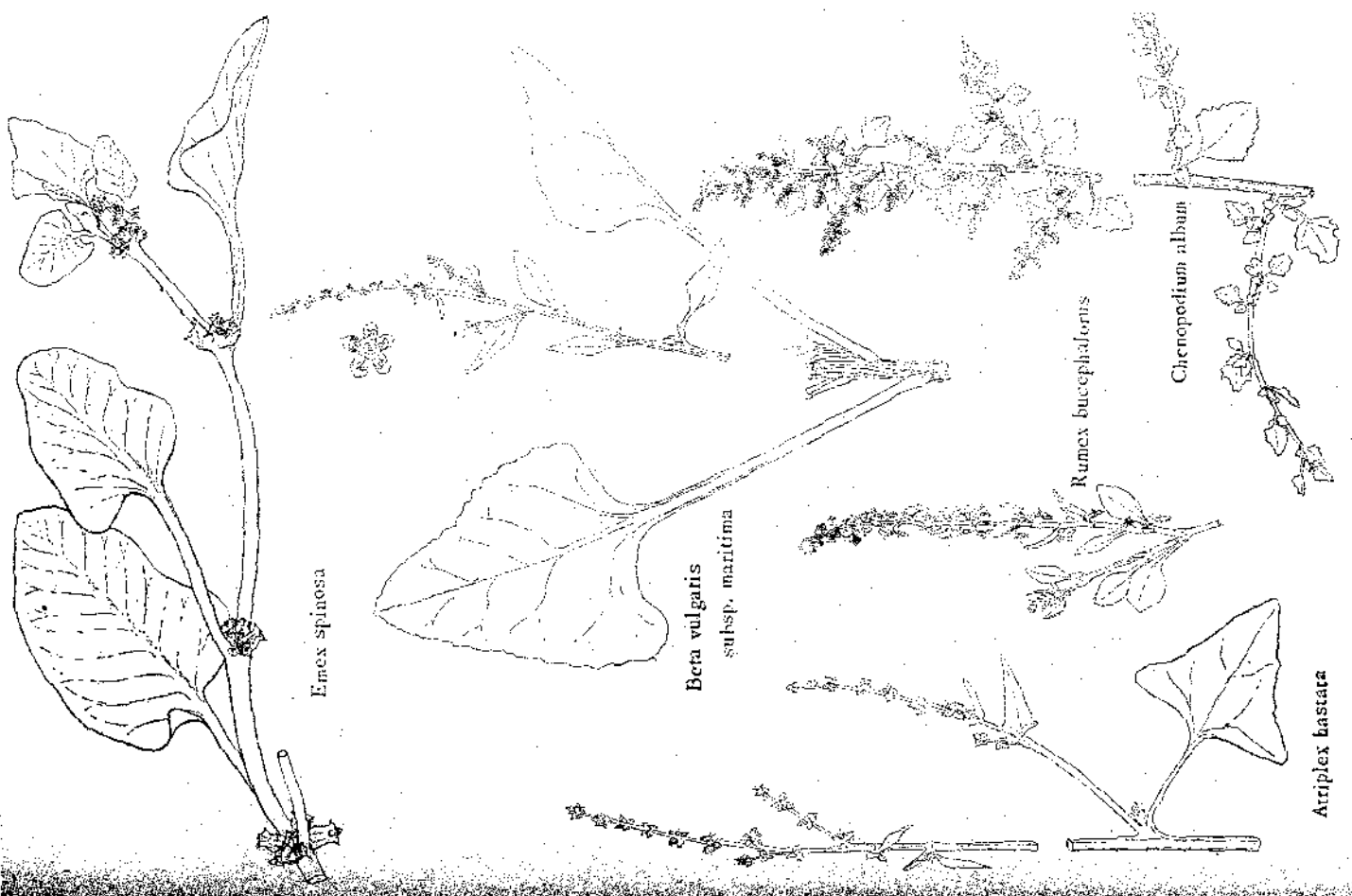


Plate V

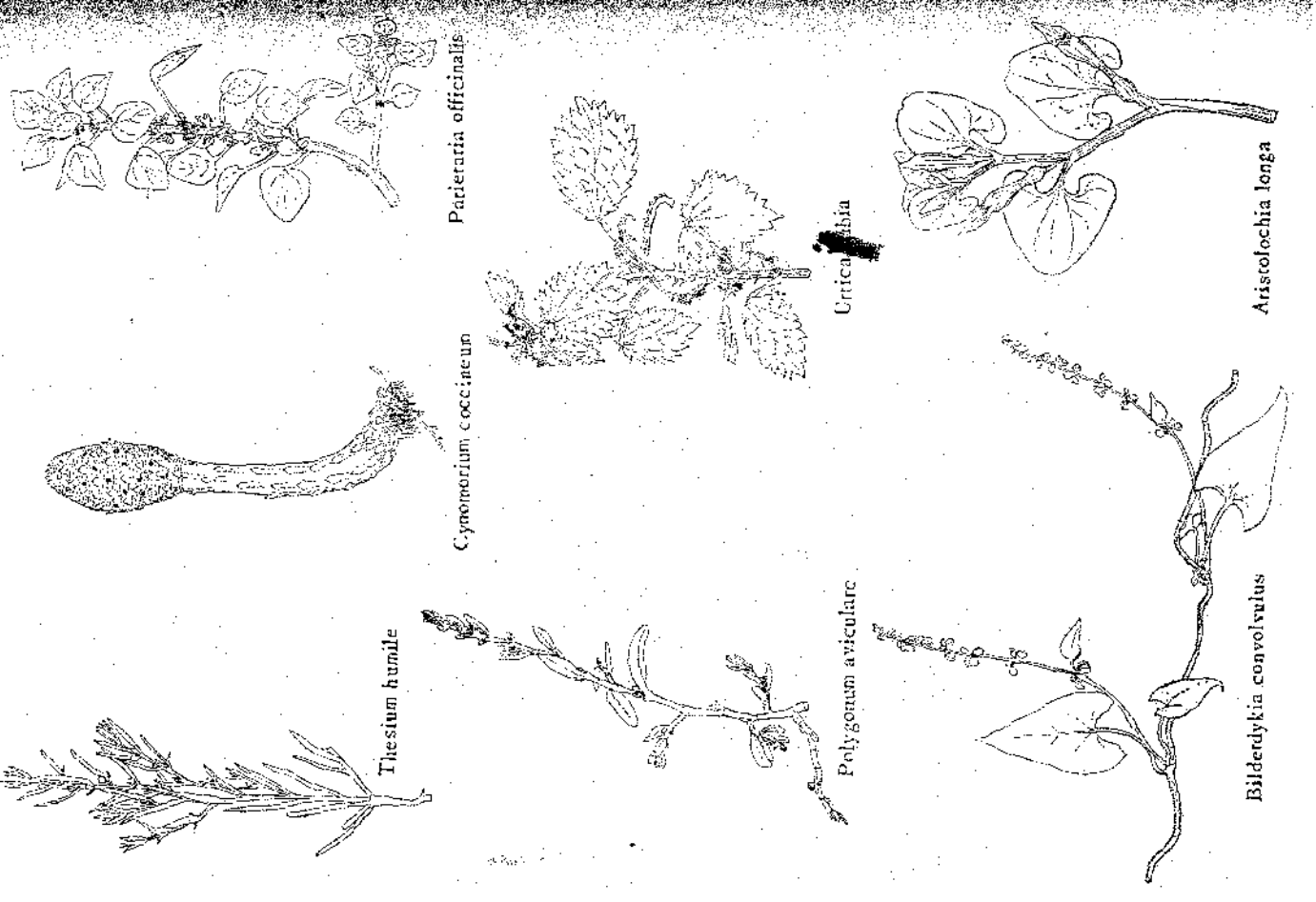
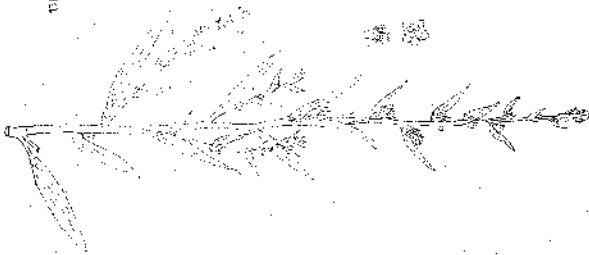


Plate IV

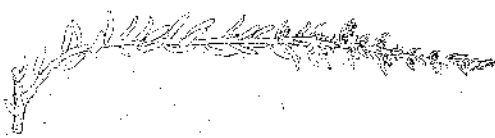
Salicornia zambosiana



Kochia scoparia



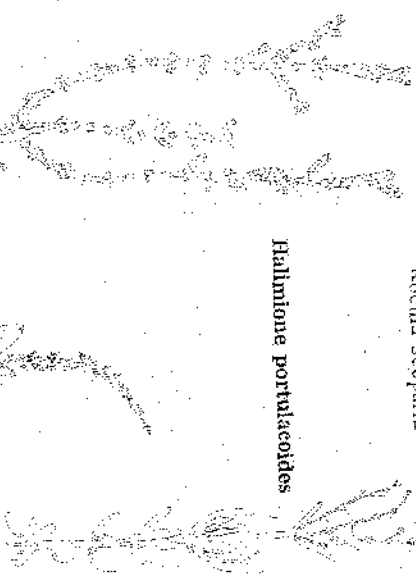
Suaeda vera



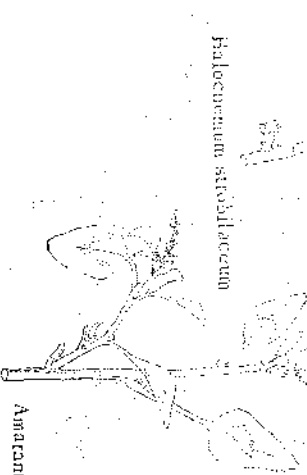
Salsola soda



Halmione portulacoides



Halocnemum strobilaceum



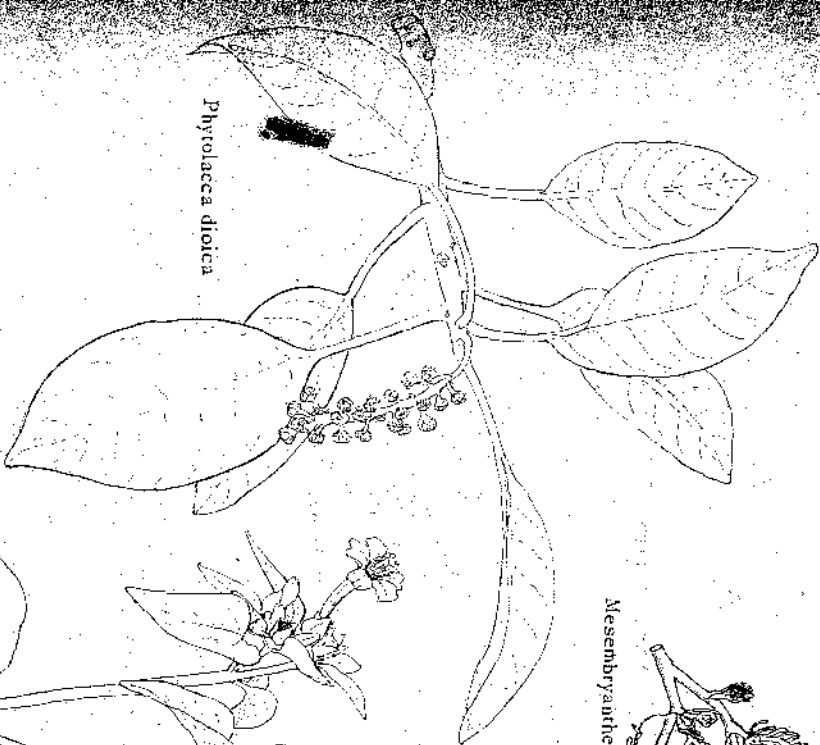
Amaranthus deflexus

Arthrocnemum glaucum



Plate VI

Phytolacca dioica



Carpobrotus acinaciformis



Mesembryanthemum nodiflorum



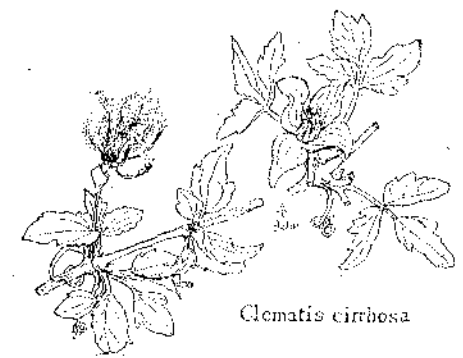
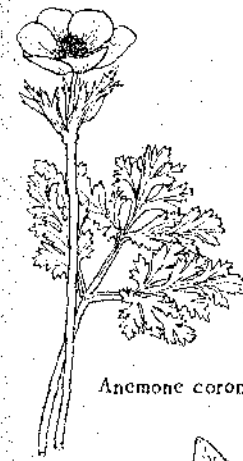
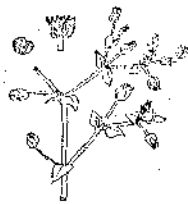
Mirabilis jalapa



Portulaca oleracea



Plate VII



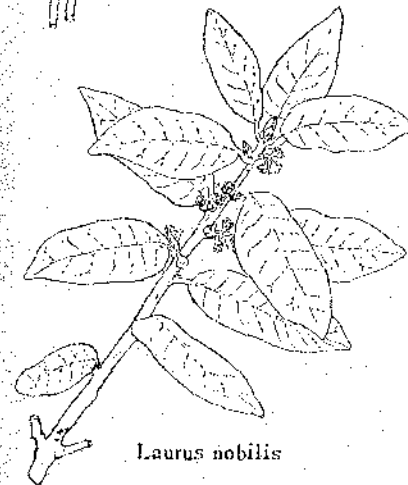
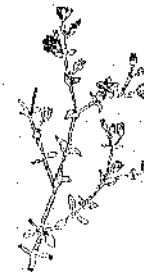
Arenaria serpyllifolia
subsp. *leptoclados*

Sagina maritima

Stellaria media

Anemone coronaria

Clematis cirrhosa



Spergularia rubra

Minuartia geniculata

Polycarpon tetraphyllum

Laurus nobilis

Nigella damascena

Delphinium halteratum

Cerastium glomeratum

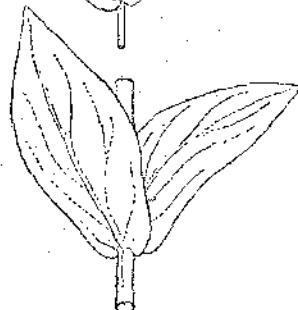
Paronychia argentea



Adonis annua



Silene colorata



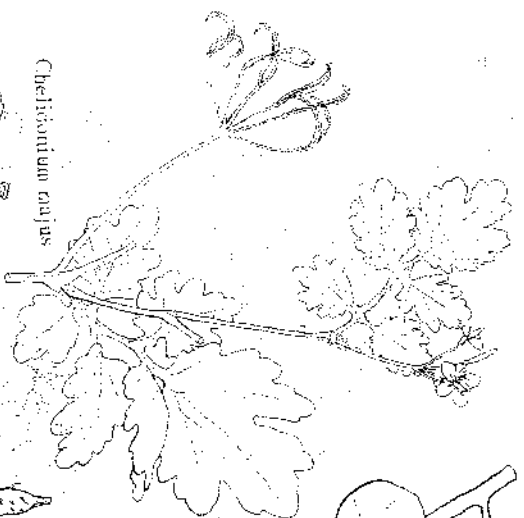
Vaccaria pyramidata

Agrostemma githago

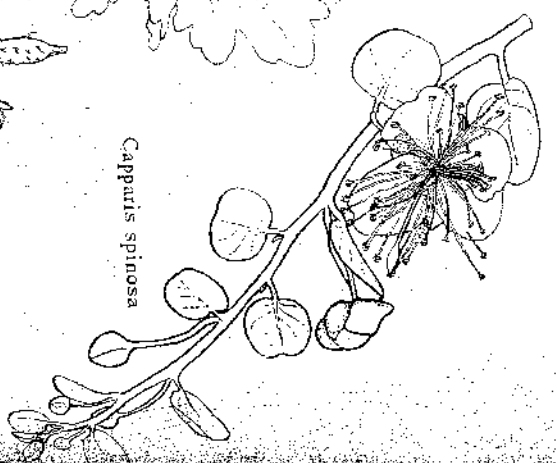
Ranunculus bullatus

Plate VIII

Plate IX



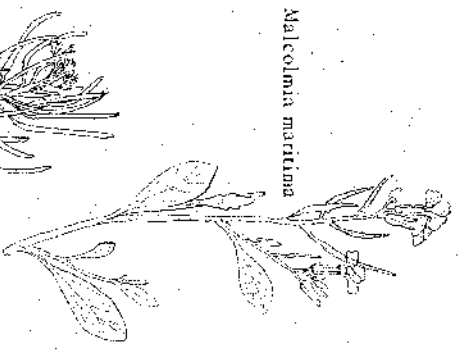
Cheilanthes calycis



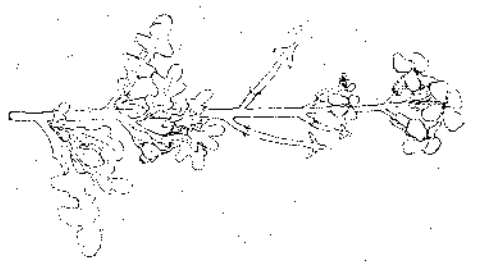
Capparis spinosa



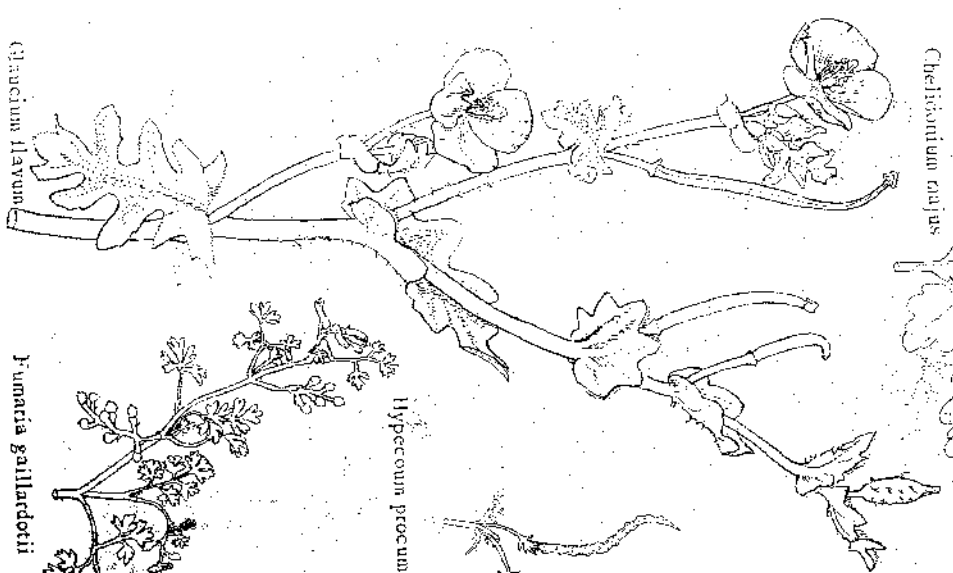
Bunias cruciata



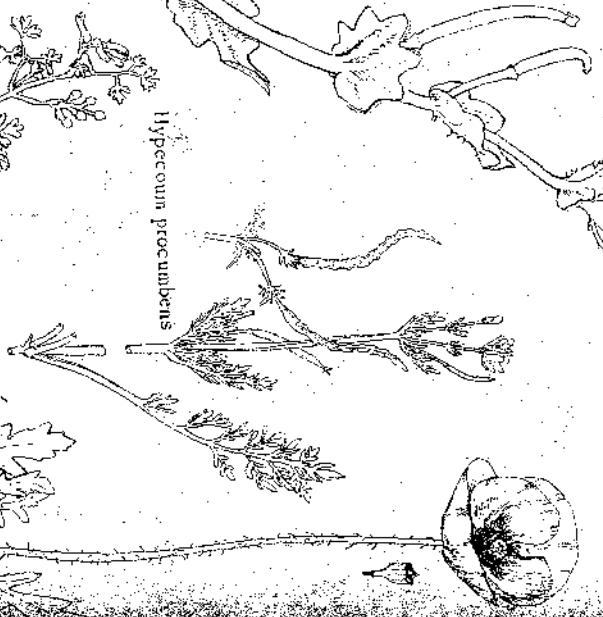
Malcolmia maritima



Mullibda unispicata



Jasium flavum



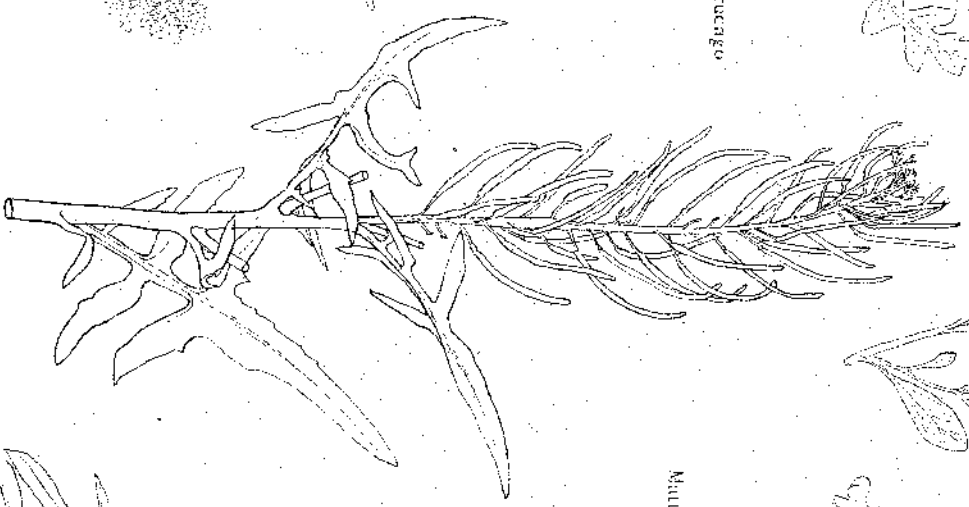
Hypericum procumbens



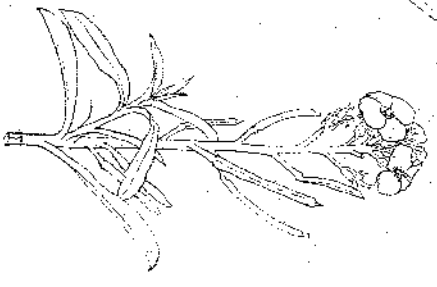
Papaver rhoeas



Macraria sepia



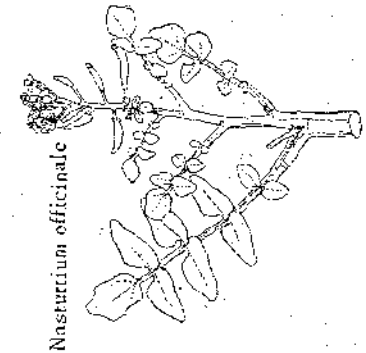
Sisymbrium irio



Cheiranthus cheiri



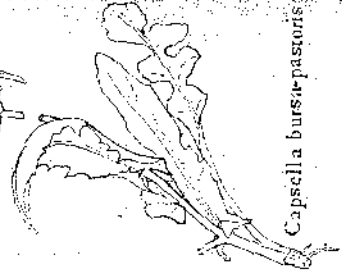
Neslia paniculata



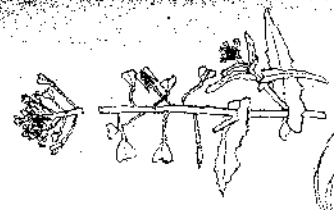
Nasturtium officinale



Teesdalia coronopifolia



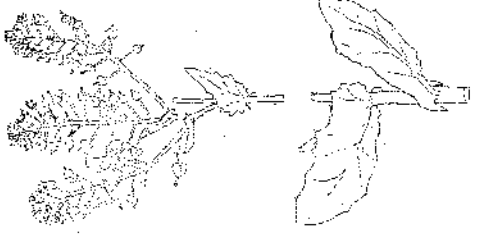
Capsella bursa-pastoris



Lepidium graminifolium



Conringia orientalis



Cardaria draba



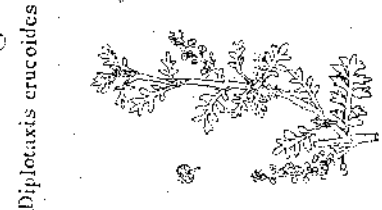
Thlaspi perfoliatum



Lobularia maritima



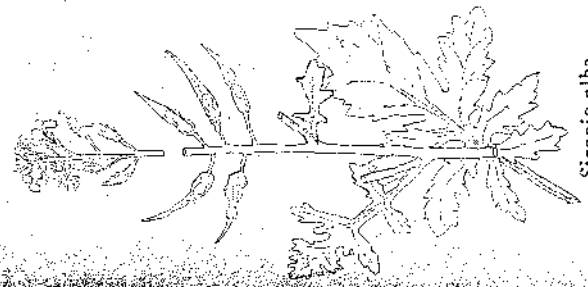
Moricandia arvensis



Coronopus didymus



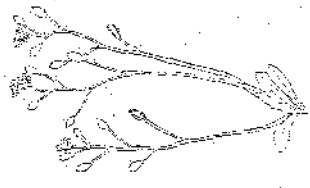
Rapistrum rugosum



Sinapis alba



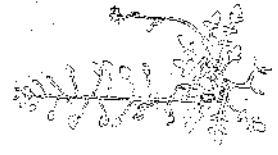
Biscutella didyma



Erophila verna



Cardamine hirsuta



Hymenolobus procumbens

Eruca vesicaria

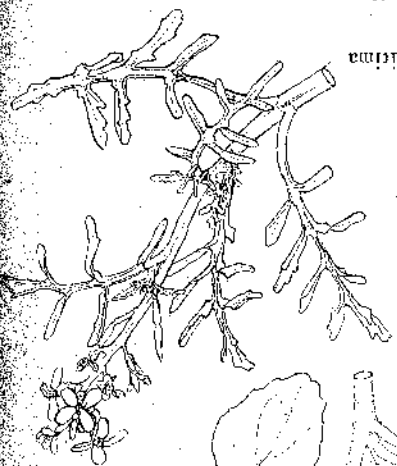


Hirschfeldia incana

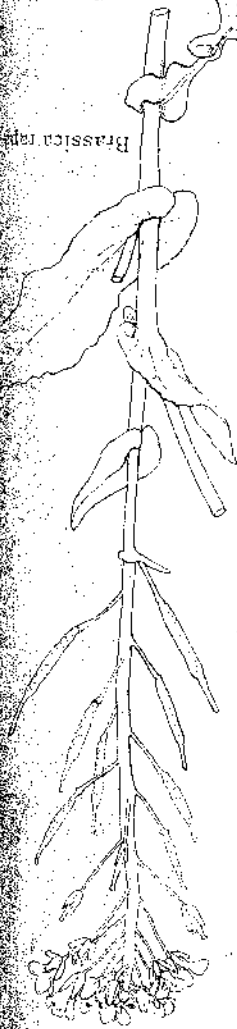


Plate XIV

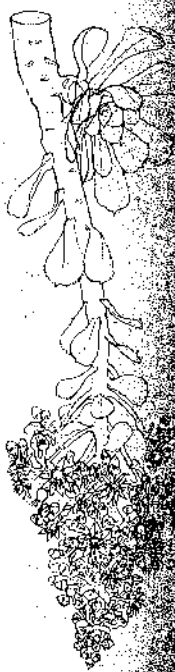
Cakile maritima



Brassica rapa



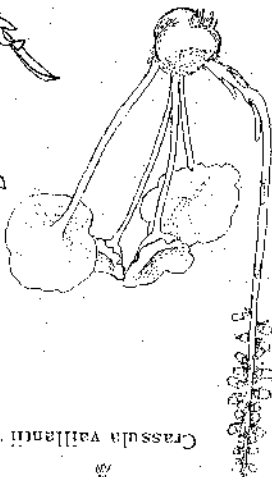
Sedum arborescens



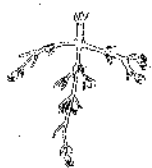
Rosa sempervirens



Umbilicus horizontalis



Crassula vallisnerii



Saxifraga tridactylites

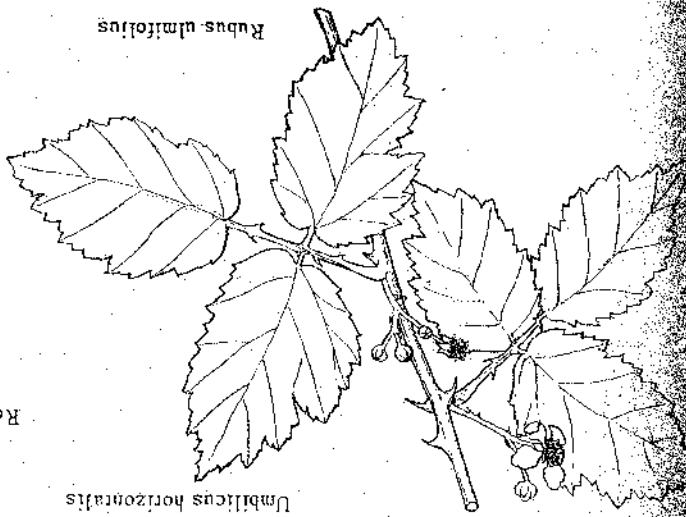


Sedum caeruleum



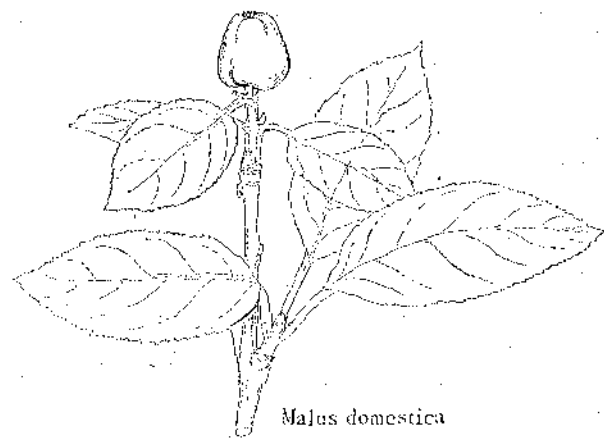
Plate XV

Rubus ulmifolius

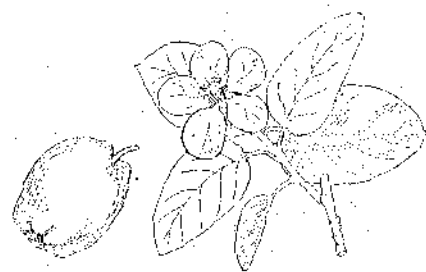


Reseda alba

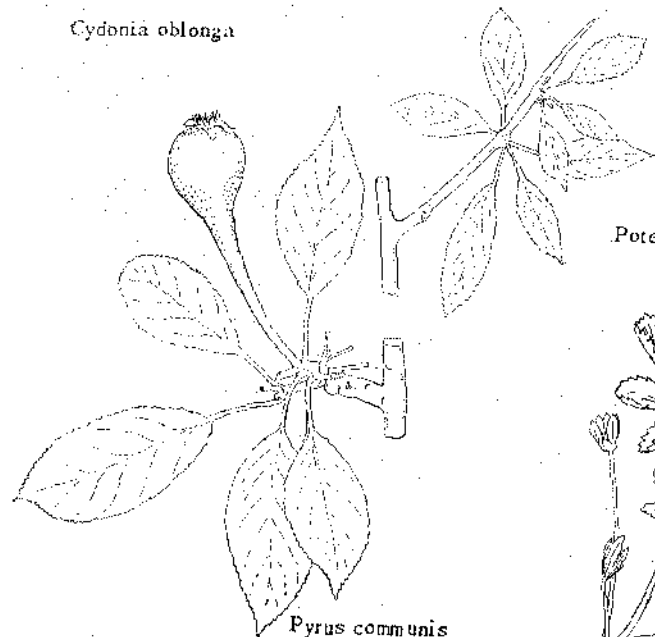




Malus domestica



Cydonia oblonga



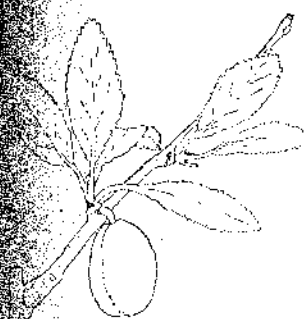
Pyrus communis



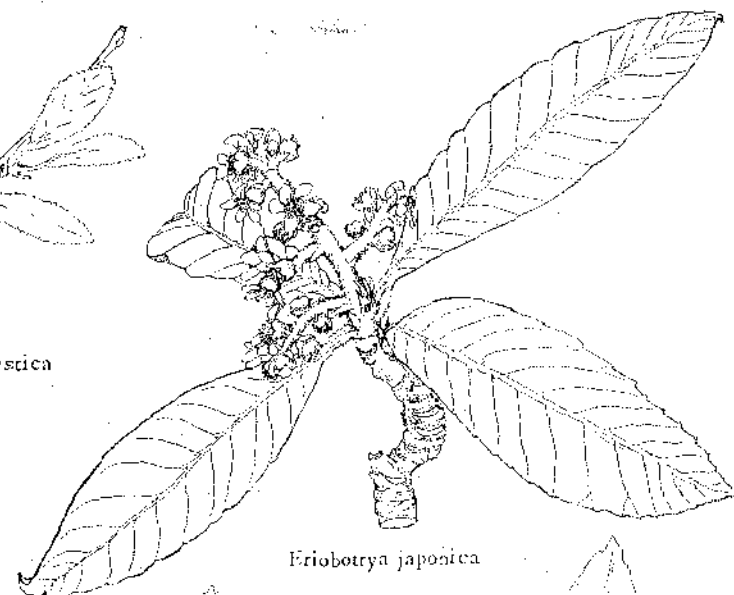
Sanguisorba minor



Potentilla reptans



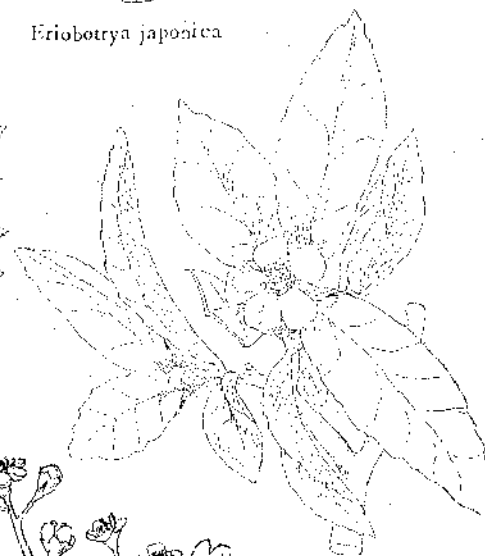
Prunus domestica



Eriobotrya japonica



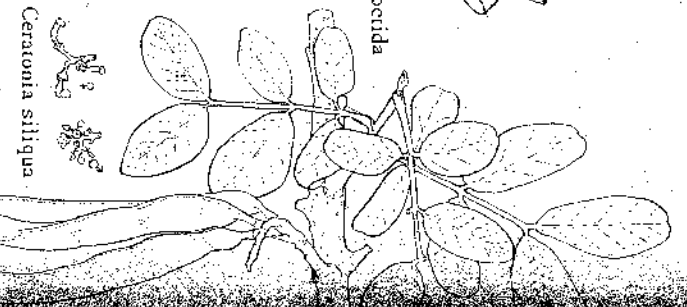
Sorbus aucuparia



Mespilus germanica



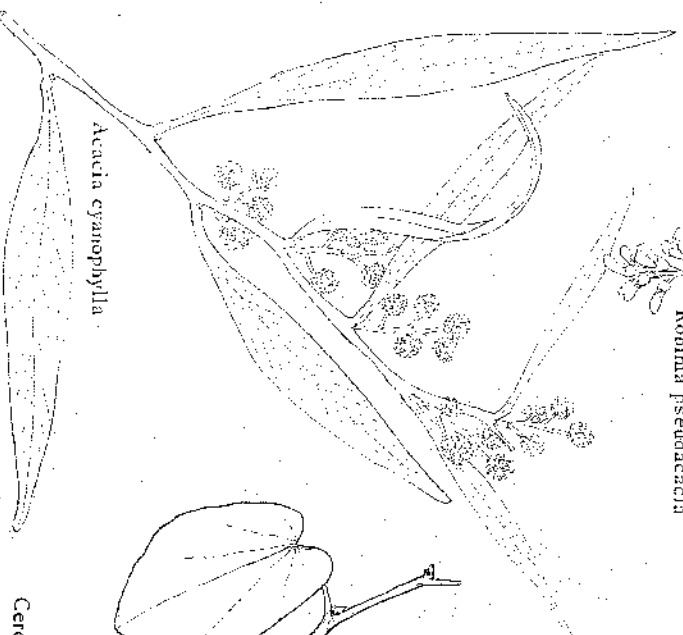
Crataegus azarolus



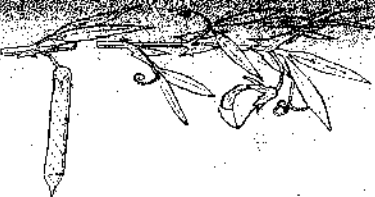
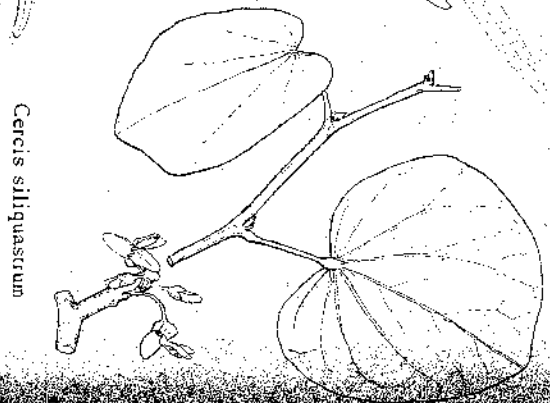
Spartium juncetum

Robinia pseudacacia

Ceratonia siliqua



Cercis siliquastrum



Anagris sphaericus

Astragalus boeoticus

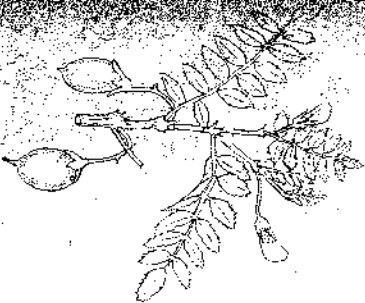


Vicia tetrasperma

Psoralea brunnosa

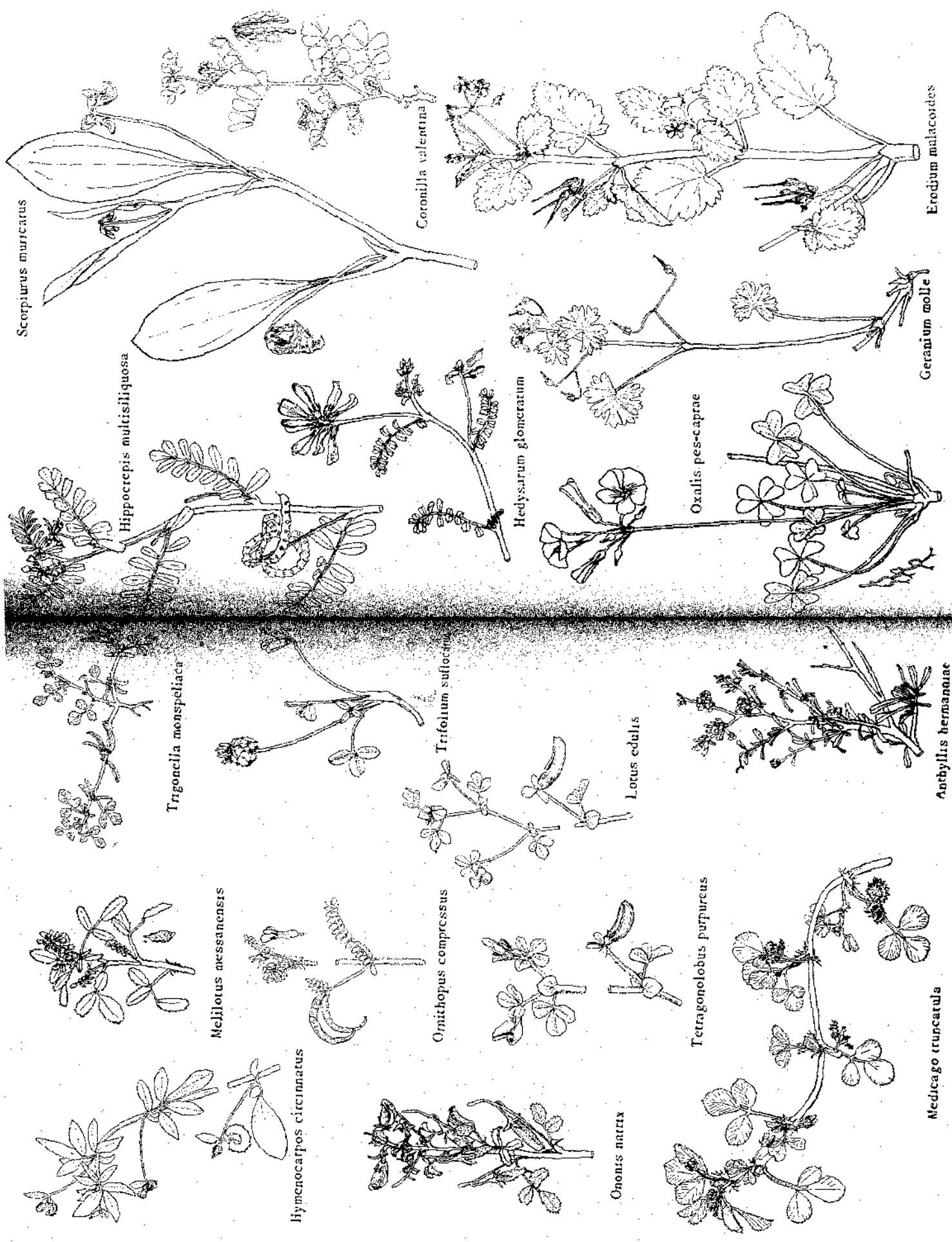


Cicer arietinum



Pisum sativum





Scorpiurus muricatus

Coronilla valentina

Erodium malacoides

Hippocrepis multisiliquosa

Hedysarum glomeratum

Geranium molle

Oxalis pes-caprae

Trigonella monspeliaca

Trifolium suffocatum

Lotus edulis

Anthyllus hermanniae

Melilotus messanensis

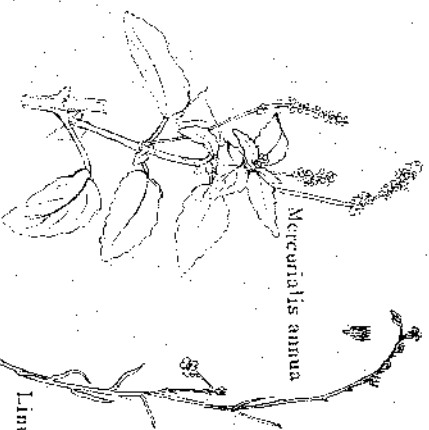
Ornithopus compressus

Tetragonolobus purpureus

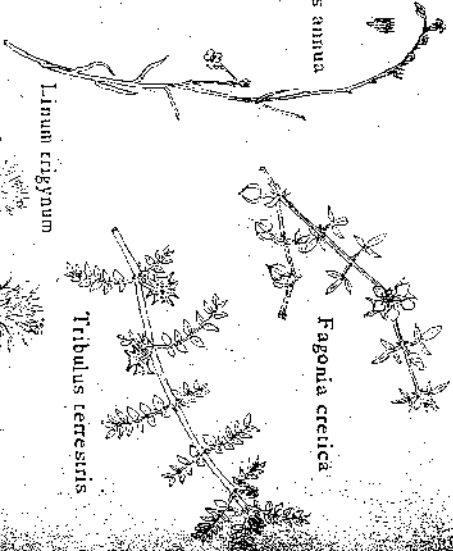
Hymenocarpus circinnatus

Ononis natrix

Medicago truncatula

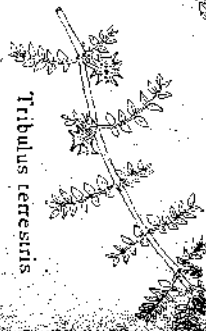


Mercularis annua

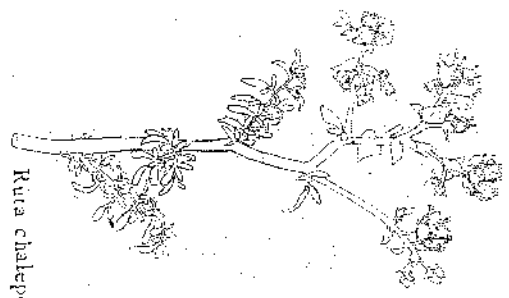


Fagonia cretica

Linum trigynum



Tribulus terrestris



Ruta chalepensis



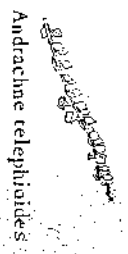
Ricinus communis



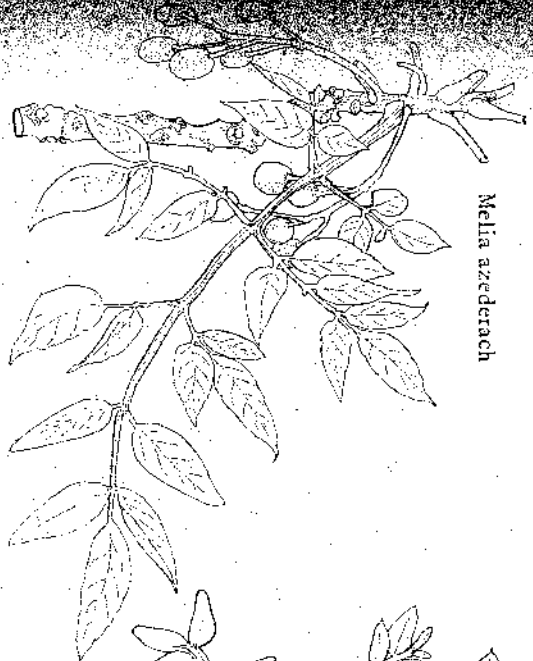
Euphorbia dendroides



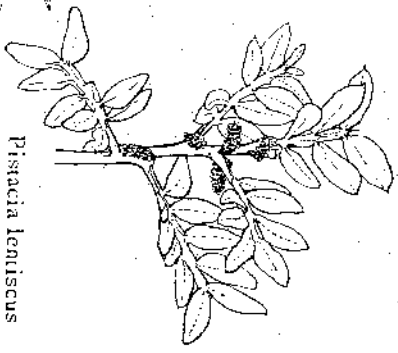
Chrozophora tinctoria



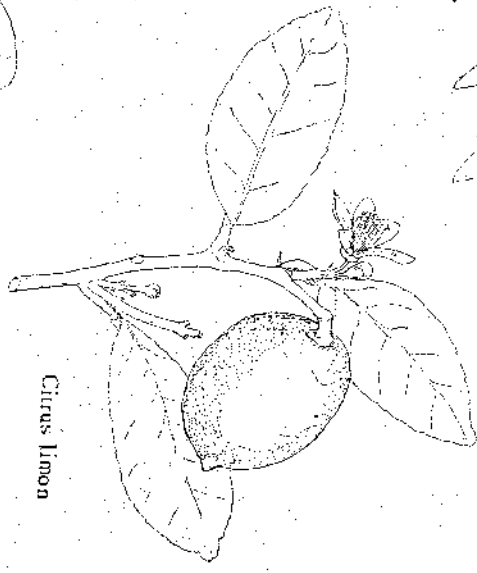
Andrachne telephioides



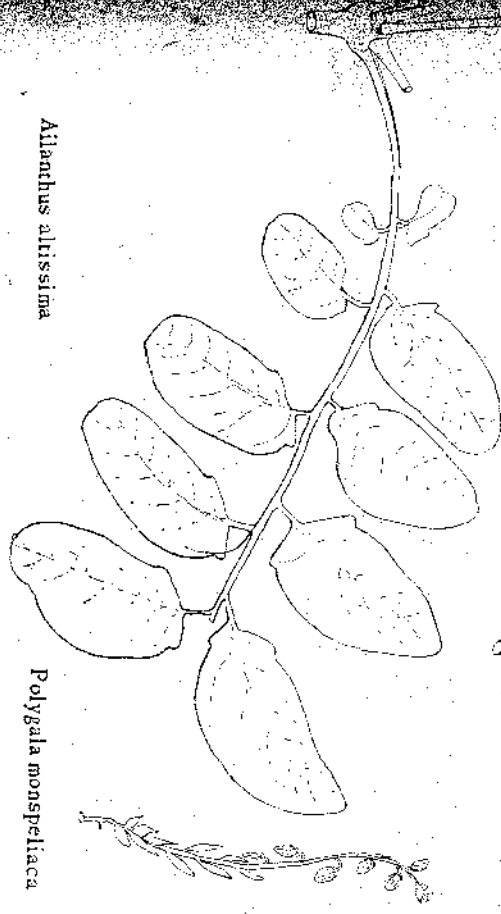
Melia azedarach



Pistacia lentiscus



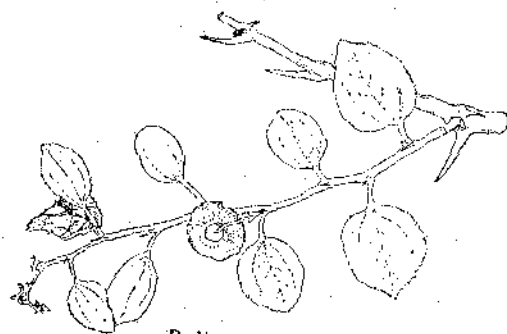
Citrus limon



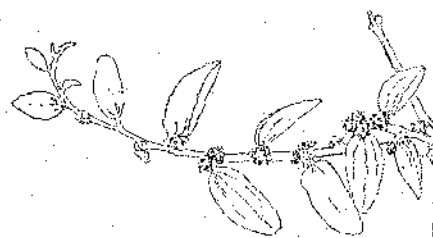
Allanthus altissima



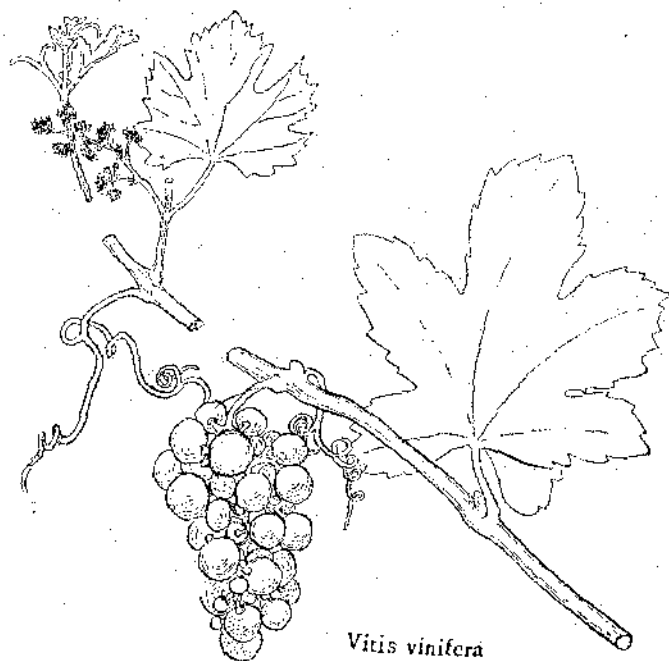
Polygala monspeliaca



Paliurus spina-christi



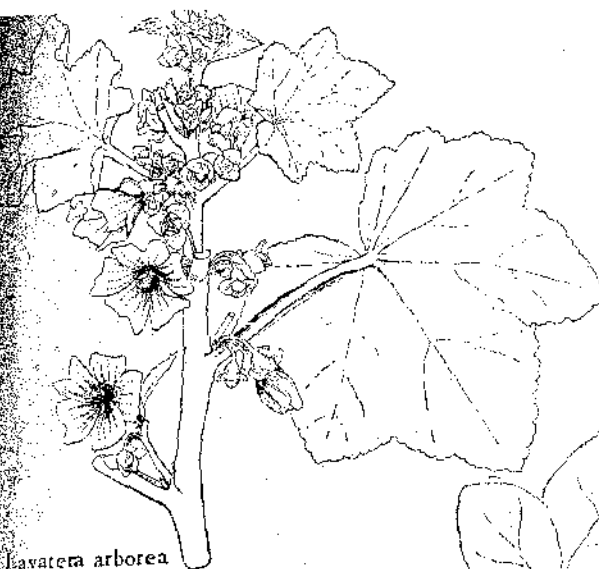
Zizyphus jujuba



Vitis vinifera



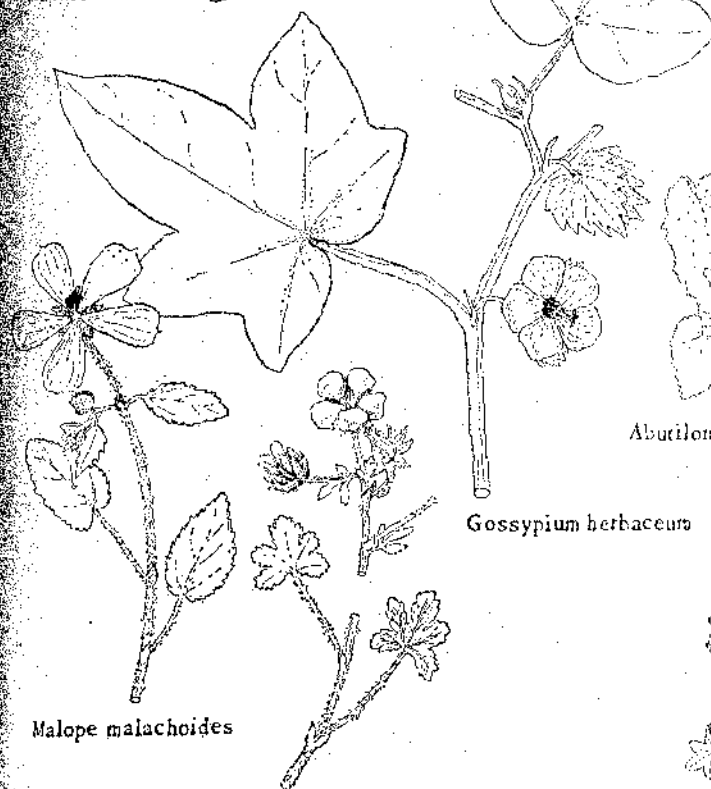
Rhamnus lycioides
subsp. *oleoides*



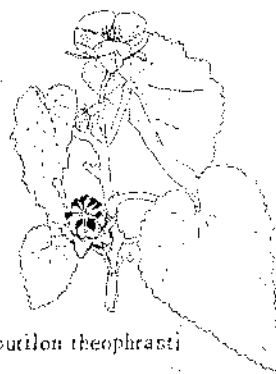
Lavatera arborea



Hibiscus trionum



Gossypium herbaceum



Abutilon theophrasti

Malope malachoides



Althaea hirsuta



Malva sylvestris



Passiflora caerulea



Viola odorata



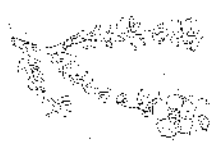
Frankenia laevis



Hypericum triquetrifolium



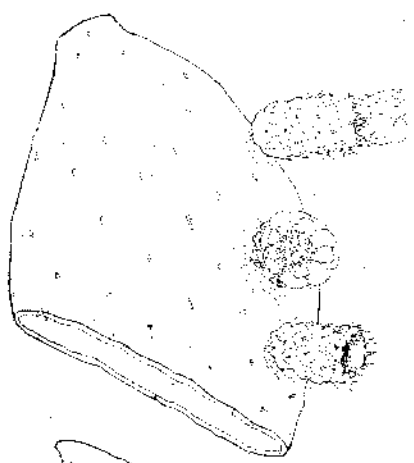
Cistus incanus



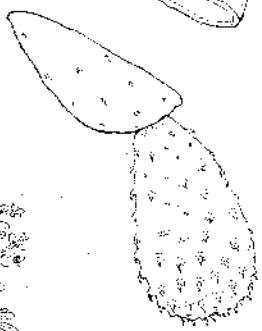
Fumana thymifolia



Thymus algericus



Opuntia ficus-indica



Elaeagnus macropoda

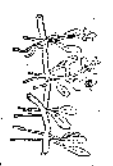


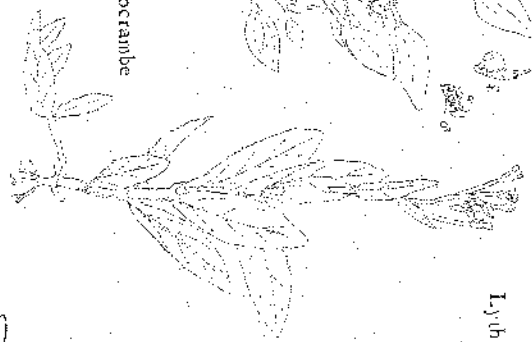
Plate XXVI



Ecballium elaterium



Theligonum cynocrambe



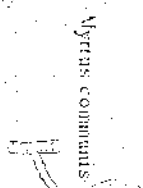
Lepidobium parviflorum



Myriophyllum verticillatum



Lythrum junceum

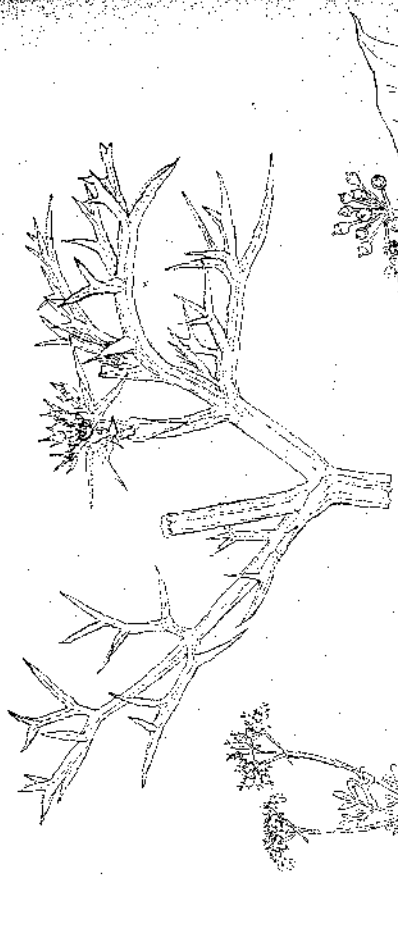


Myrtus communis

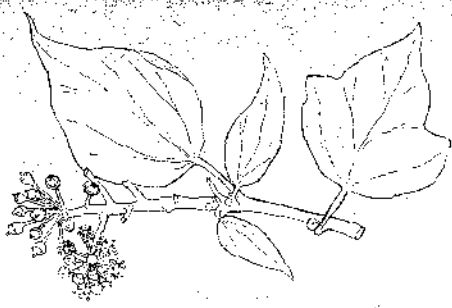


Punica granatum

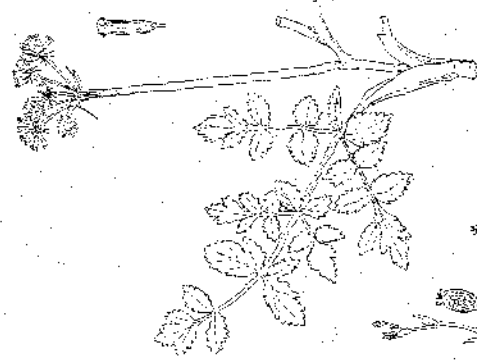
Plate XXVII



Echinophora spinosa



Hedera helix



Kundmannia sicula



Bupleurum semicompositum



Scandix pecten-veneris



Oenanthe globulosa

Pimpinella peregrina

Smyrnium olusatrum

Crithmum maritimum

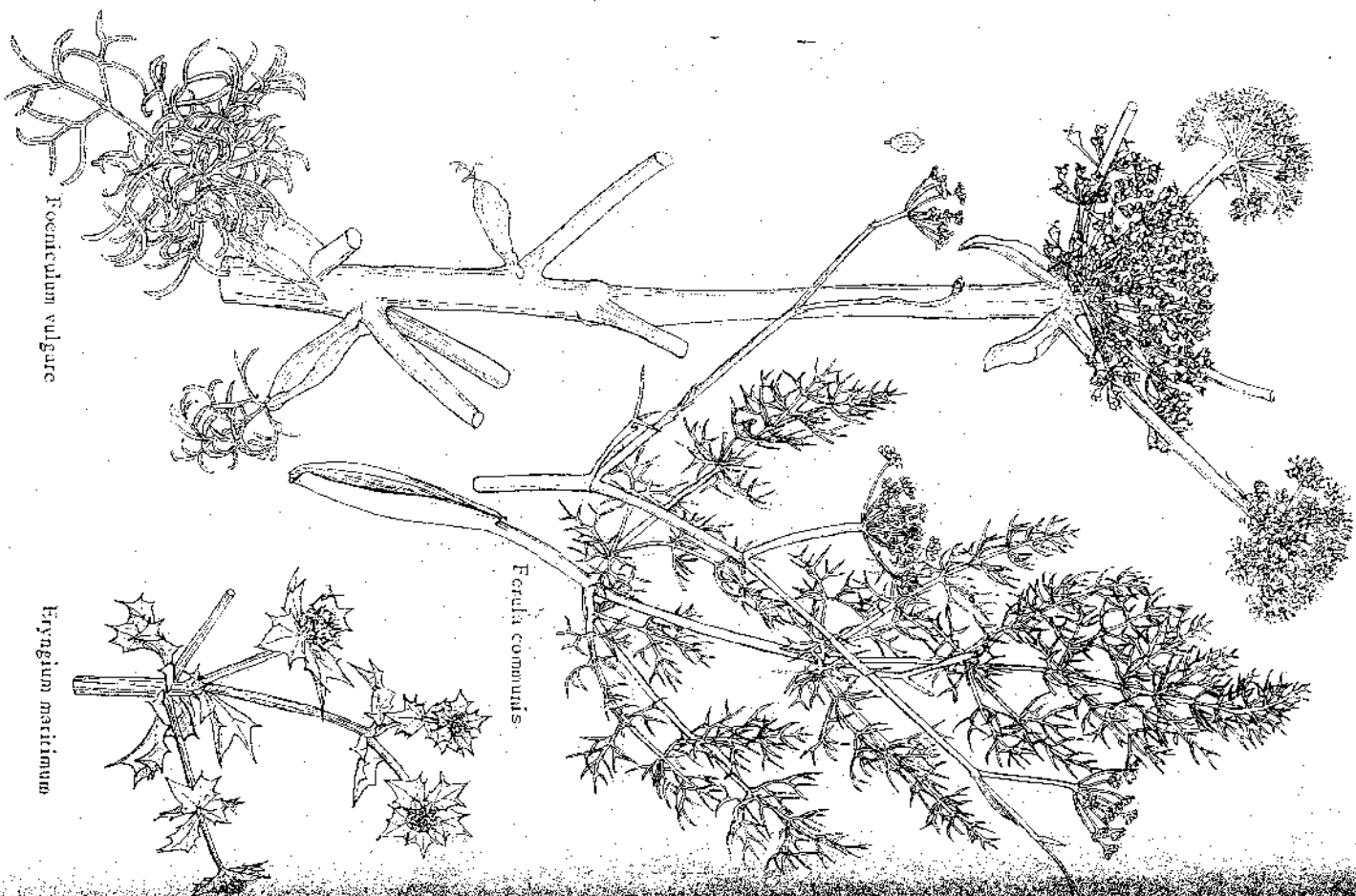


Plate XXX

Ferocellum crispum

Ribollia segetum

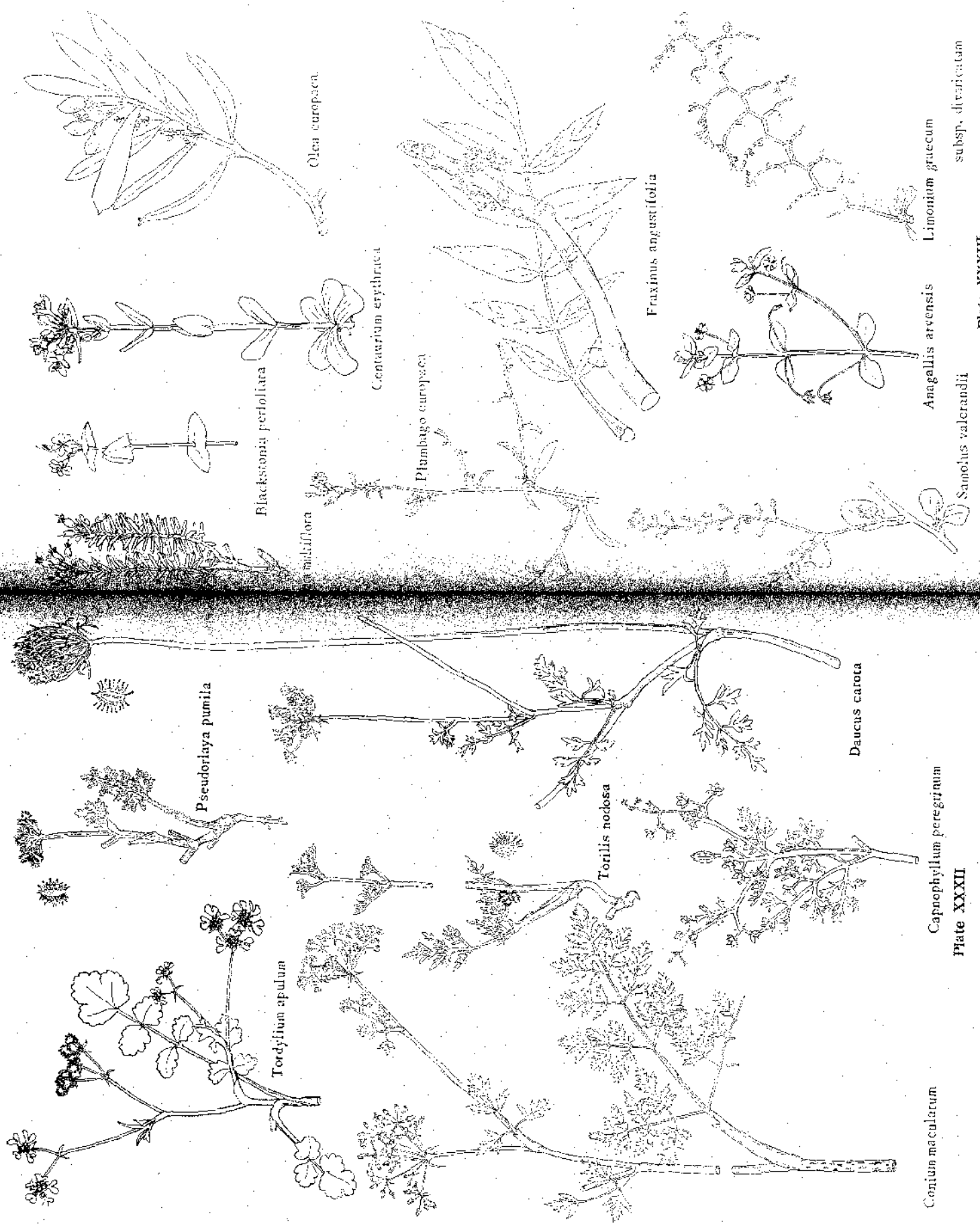
Anni majus

Apium nodiflorum

Amoides pusilla

Cuminum cyminum

Plate XXXI



subsp. divaricatum

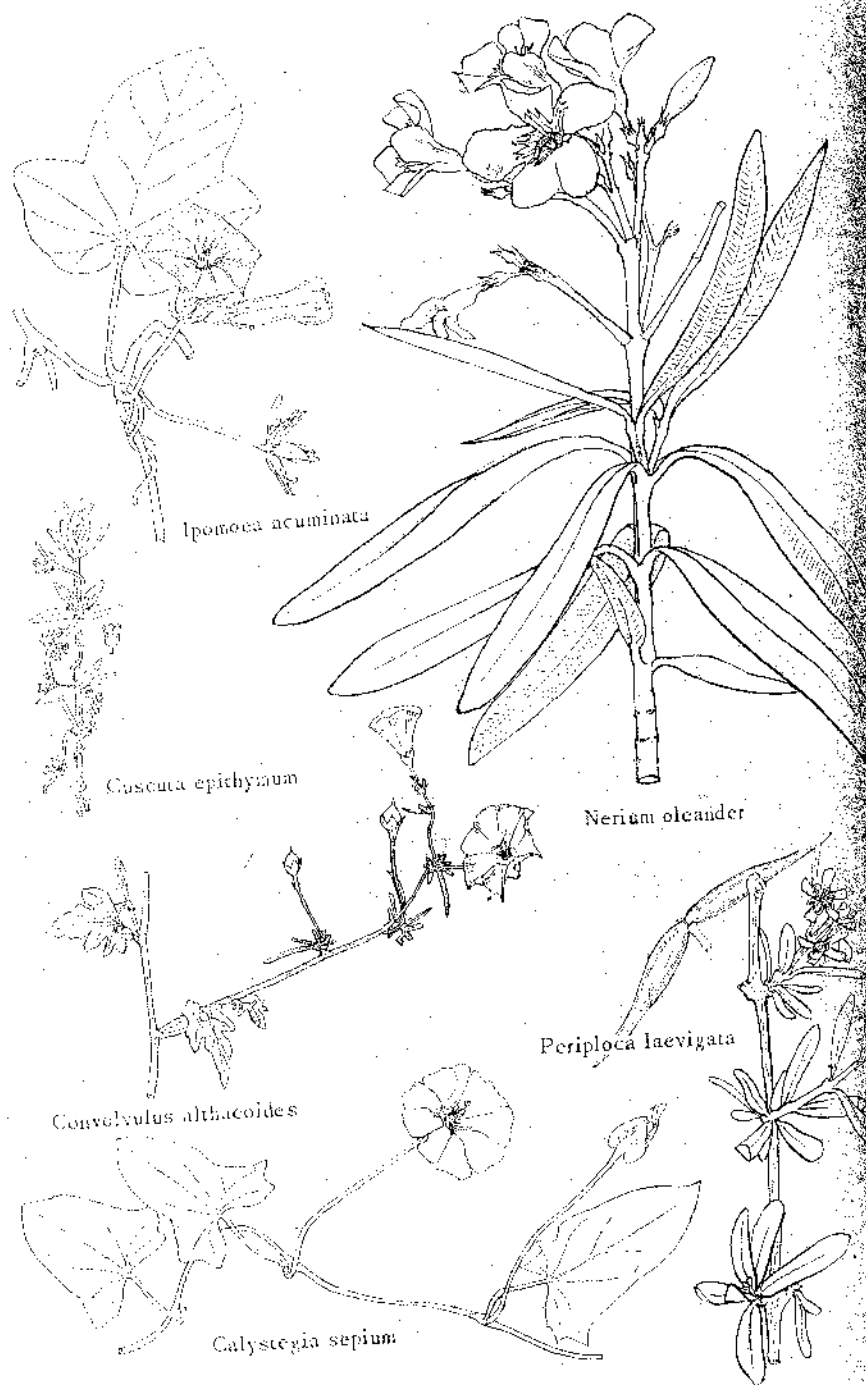


Plate XXXIV

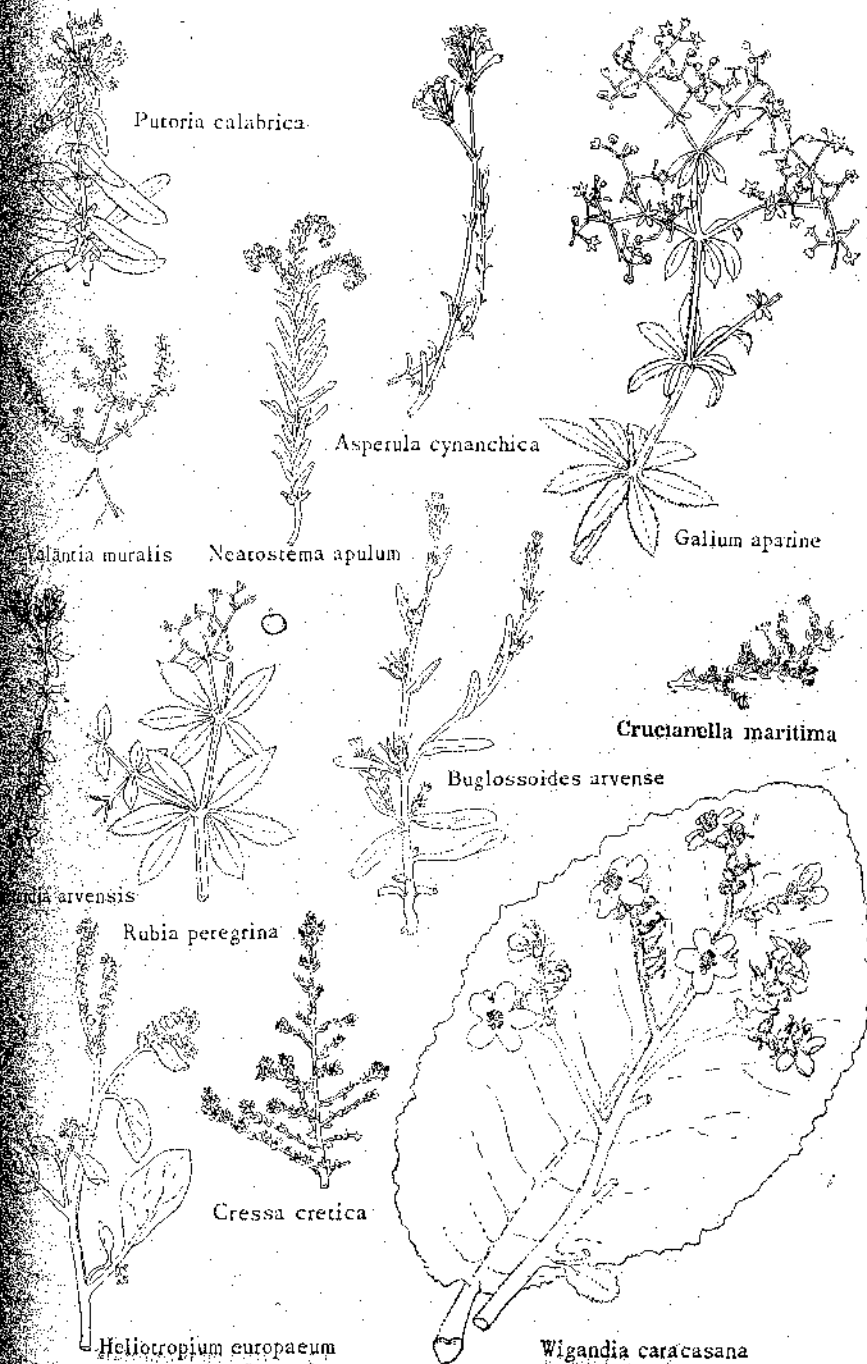
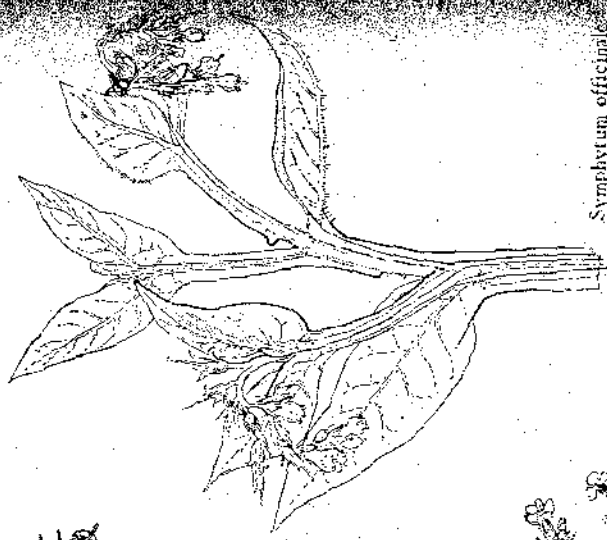


Plate XXXV



Cerinthe major



Symphytum officinale



Anchusa azurea



Borago officinalis

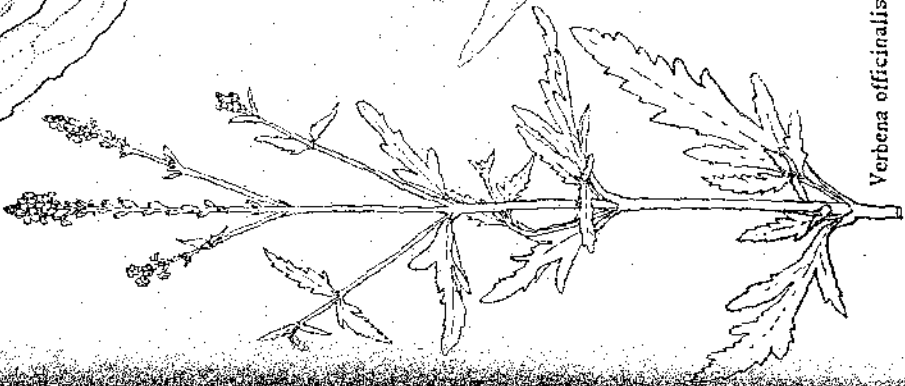


Cynoglossum erectum

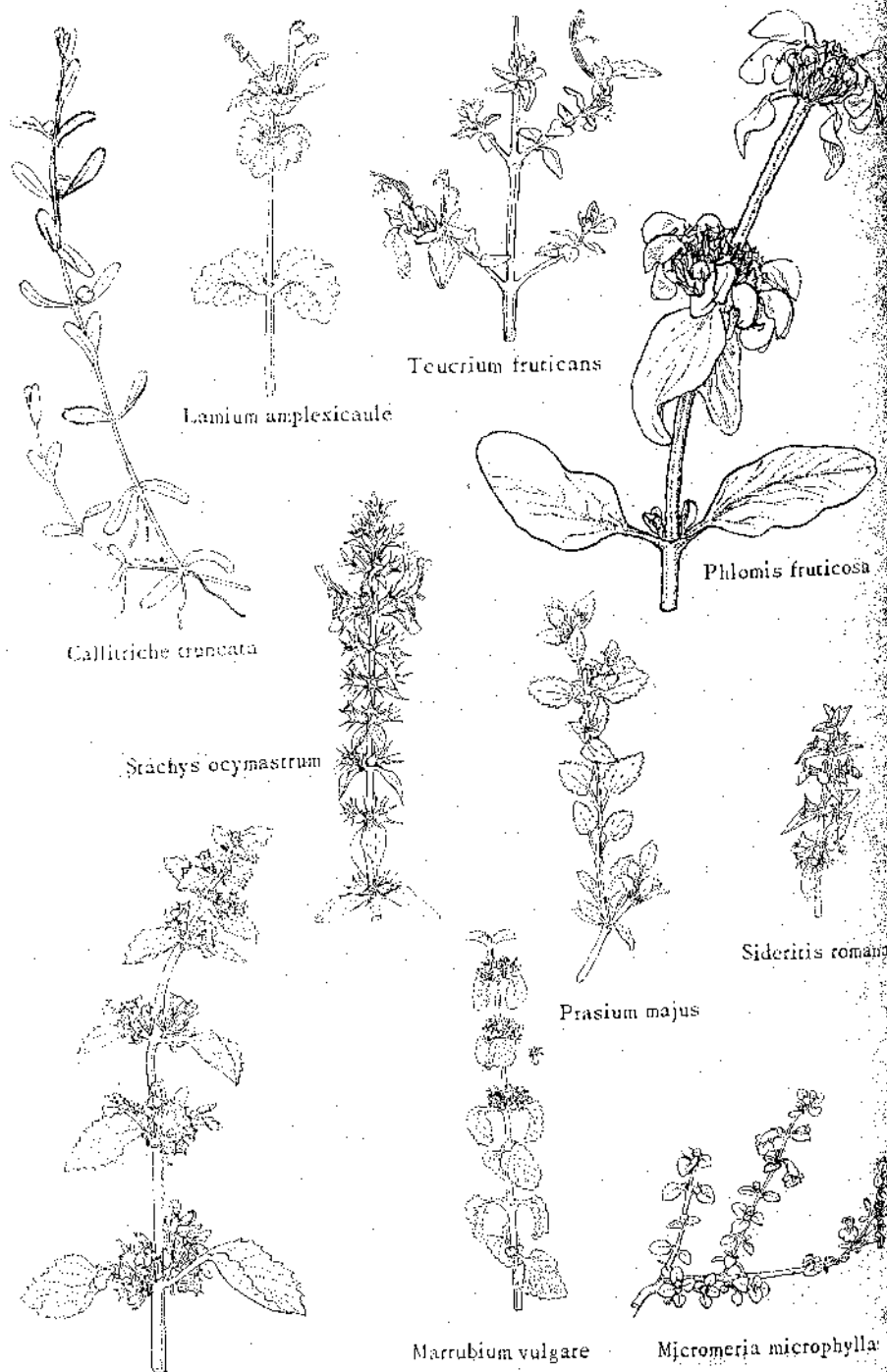
Echium
plantaginum



Vitex agnus-castus



Verbena officinalis



Lamium amplexicaule

Teucrium fruticans

Phlomis fruticosa

Callitriche truncata

Stachys ocymastrum

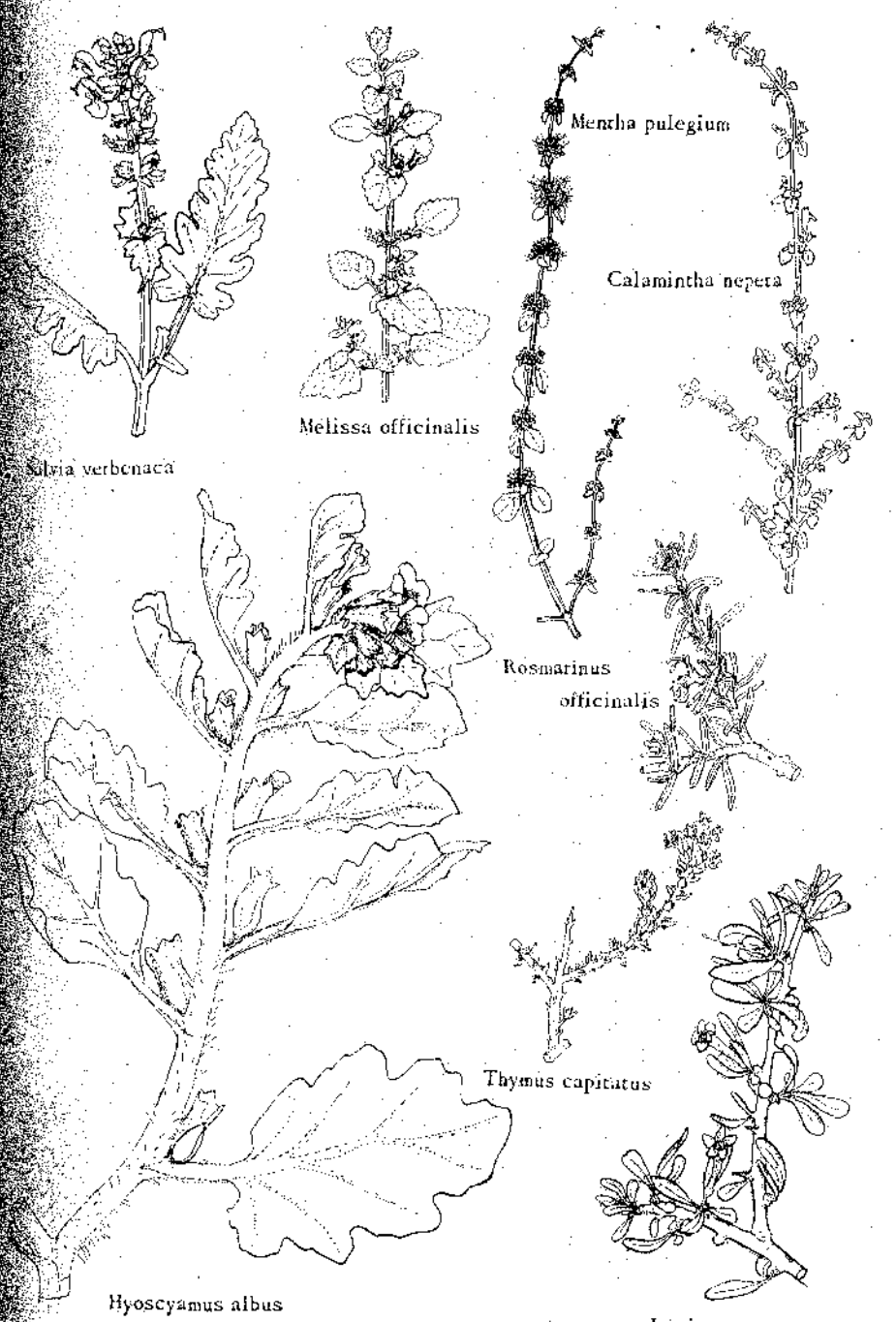
Prasium majus

Sideritis romana

Marrubium vulgare

Micromeria microphylla

Ballota nigra subsp. *uncinata*



Mentha pulegium

Calamintha nepeta

Melissa officinalis

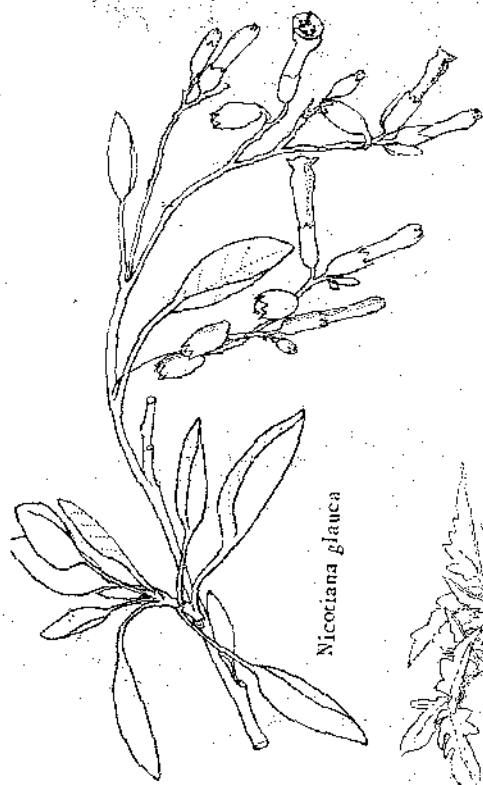
Salvia verbenaca

Rosmarinus officinalis

Thymus capitatus

Hyoscyamus albus

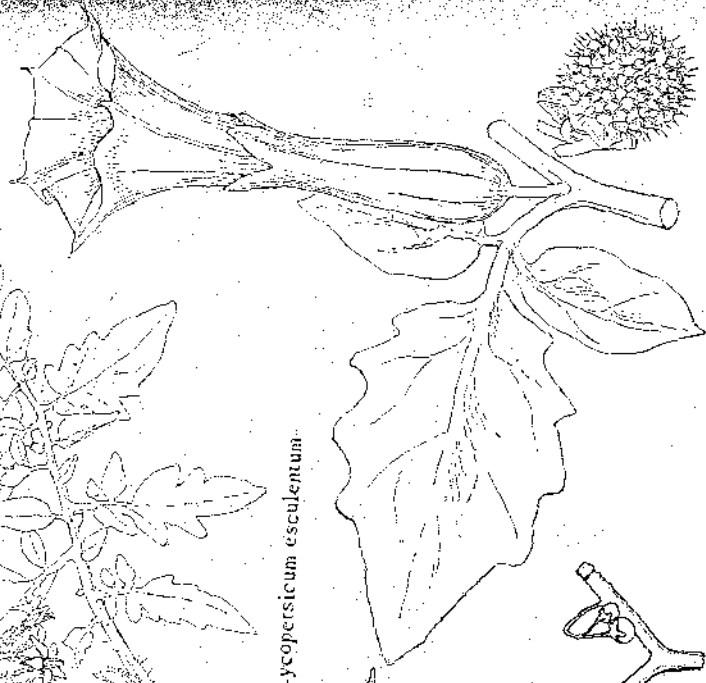
Lycium europaeum



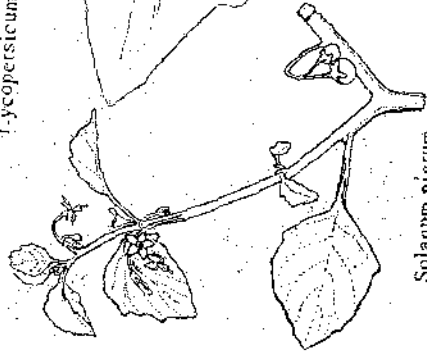
Nicotiana glauca



Lycopersicon esculentum



Datura metel



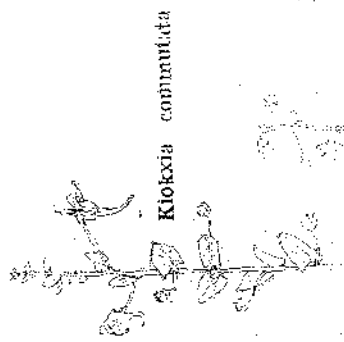
Solanum nigrum

Plate XL



Verbena

angulata-aquatica



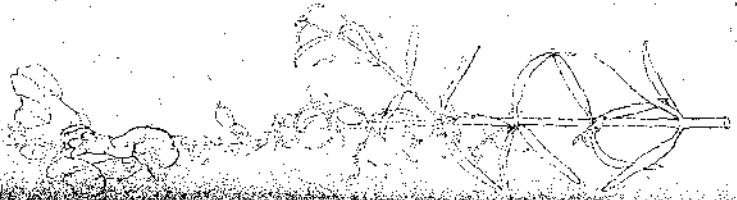
Klokxia commutata



Hiera triphylla



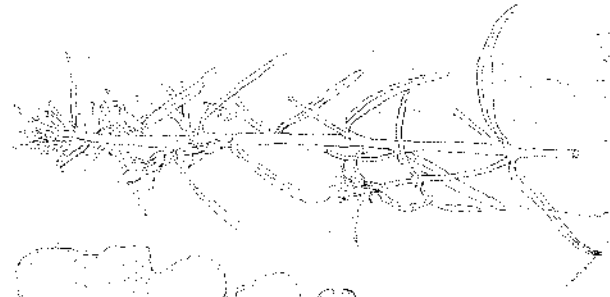
Cynodactylon variatum



Anurthium majus

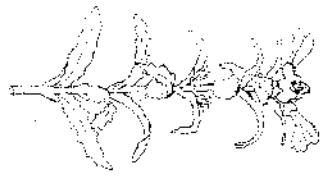


Verbascum sinuatum



Misopates orcutia

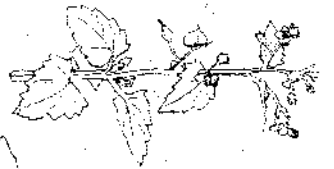
Plate XLI



Belamcanda chinensis



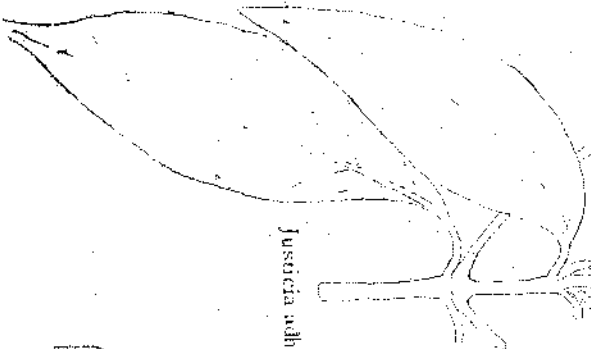
Scrophularia peregrina



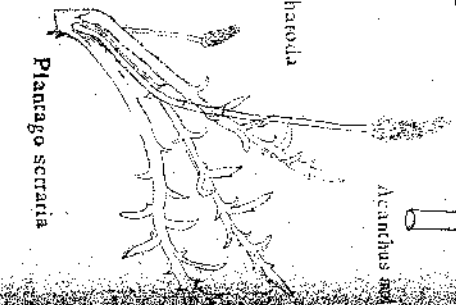
Paranuclella viscosa



Orobanchae crenata

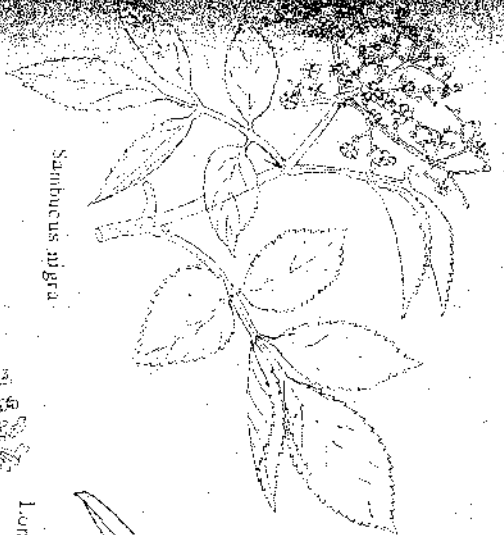


Jussea albarota



Plantago scutaria

Acanthus mollis

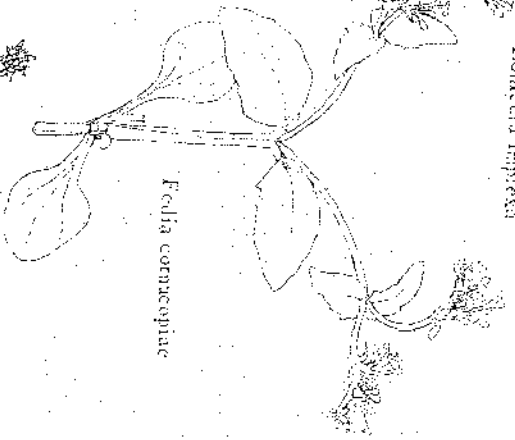


Sambucus nigra

Paranuclella crinocarpa



Lonicera implexa



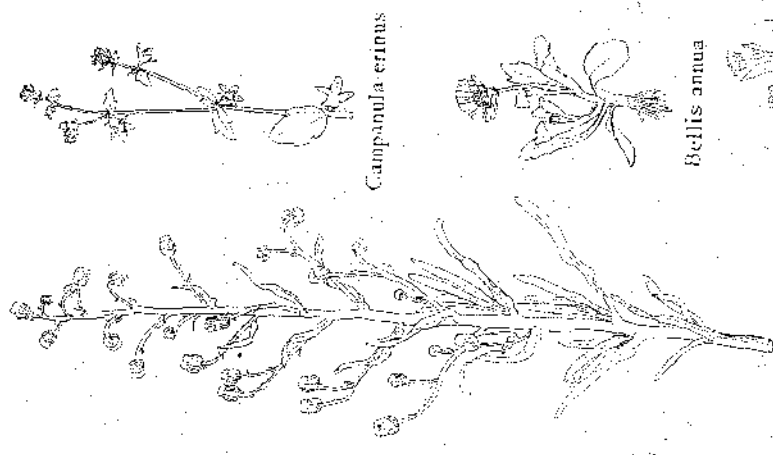
Folia cornuopinae



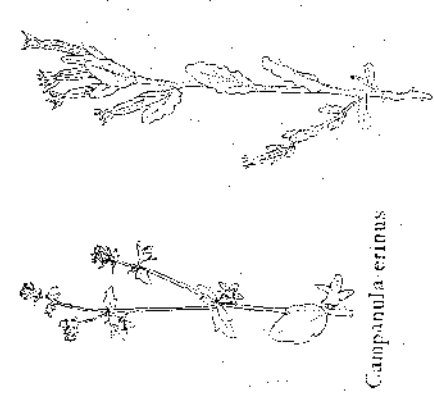
Scabiosa atropurpurea



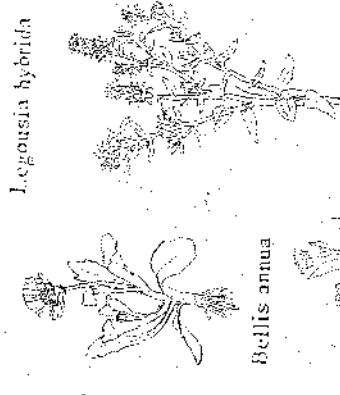
Centranthus calycitrapa



Conyza bonariensis



Campanula erinus

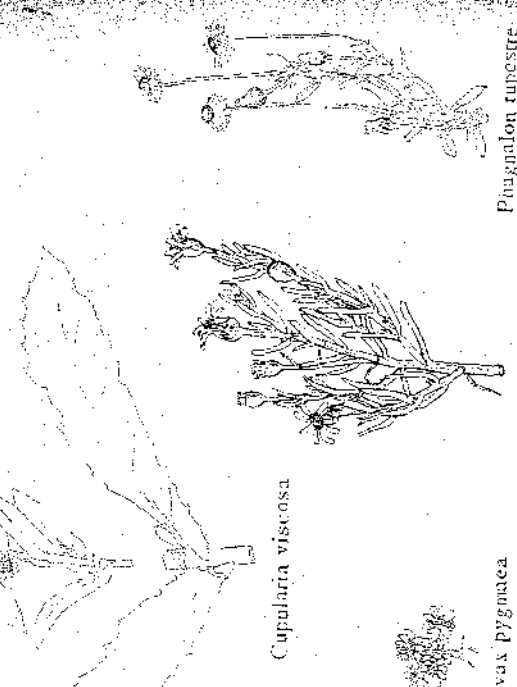


Bellis annua



Leonurus hybrida

Aster squamatus



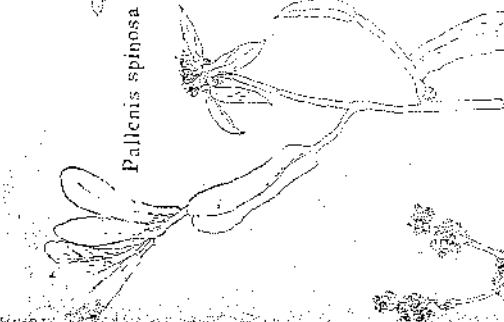
Cupularia viscosa

Evax pygmaea

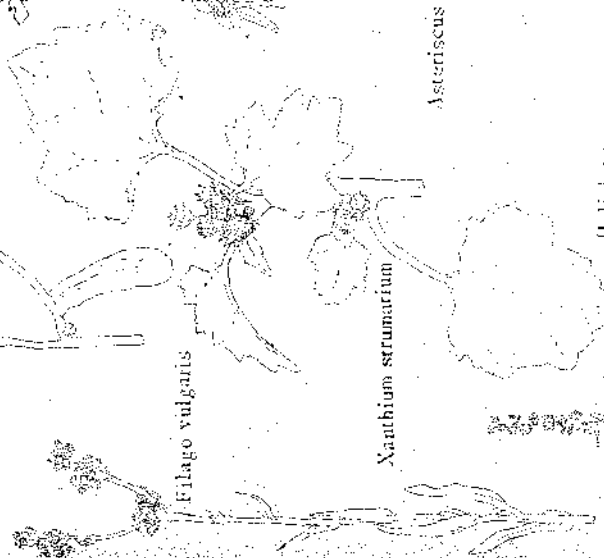
Pulicaria dysenterica

Inula crithmoides

Pinguicula vulgaris

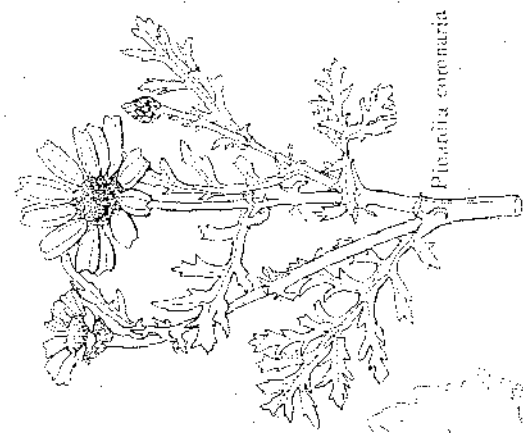


Pallenis spinosa



Filago vulgaris

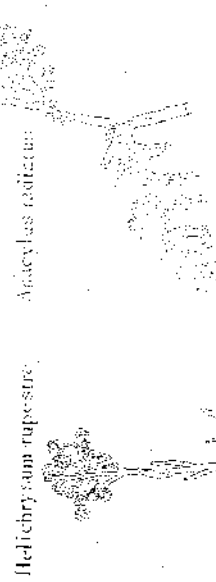
Xanthium strumarium



Picnula coronaria



Asteriscus aquaticus



Helichrysum rupestre

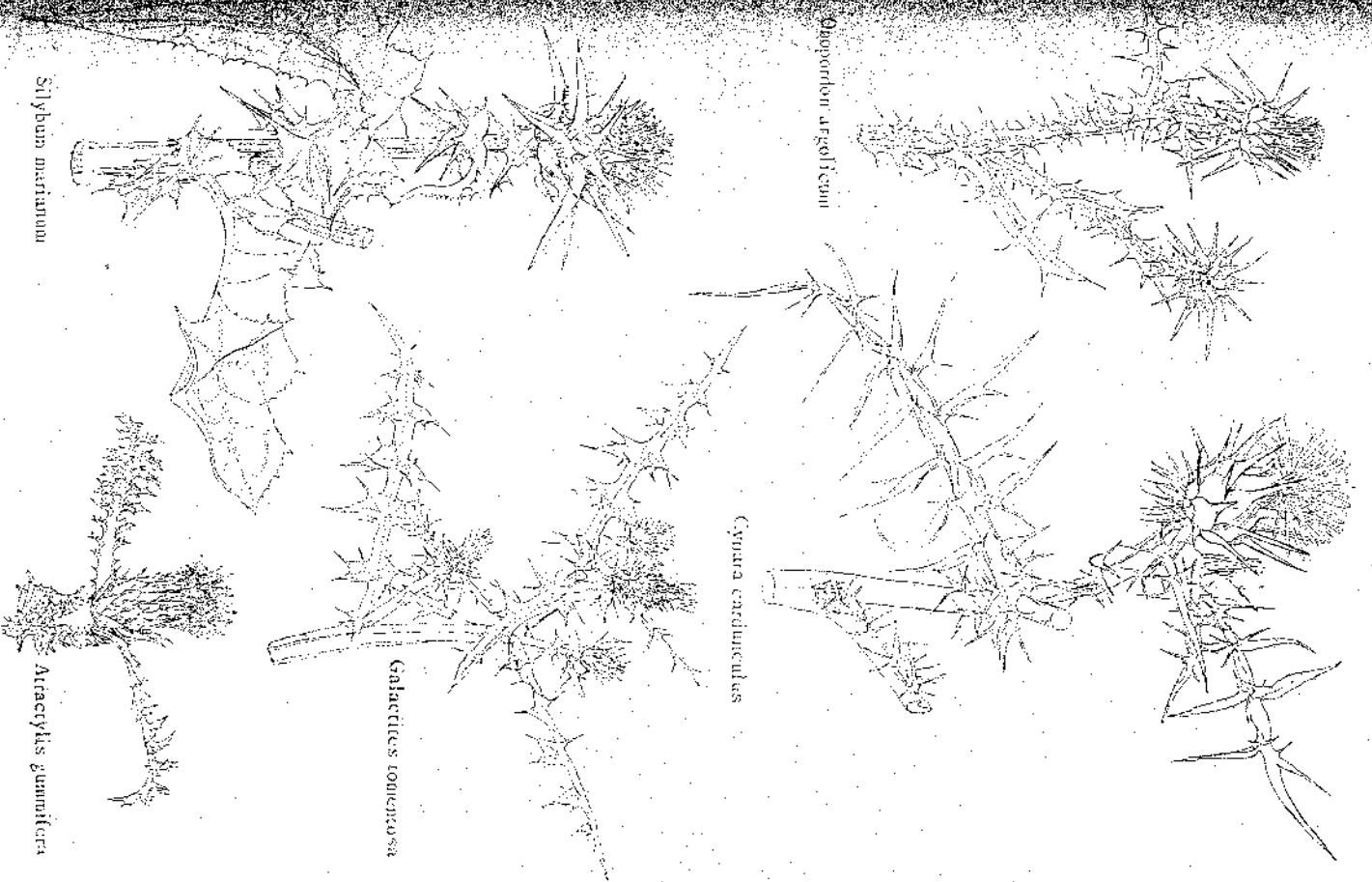
Achillea millefolium



Andrenis socodrinica subsp. ovilleana



Ambrosia maritima



Carduus pycnostachyus

Plate XLVI Chamomilla recutita

Plate XLVII



Plate XLIX



Plate XLVIII

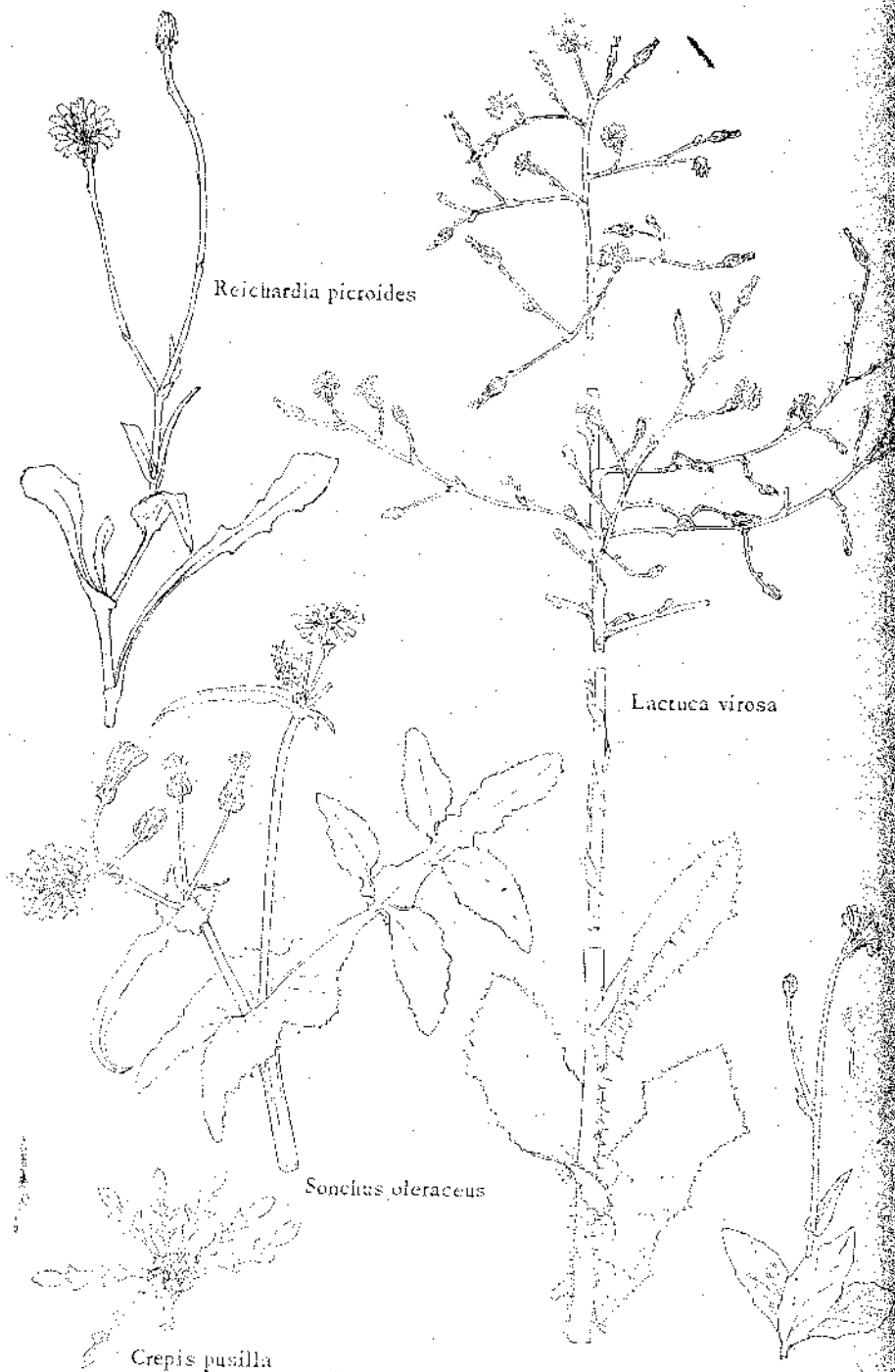


Plate L

Hypochaeris achyrophorus

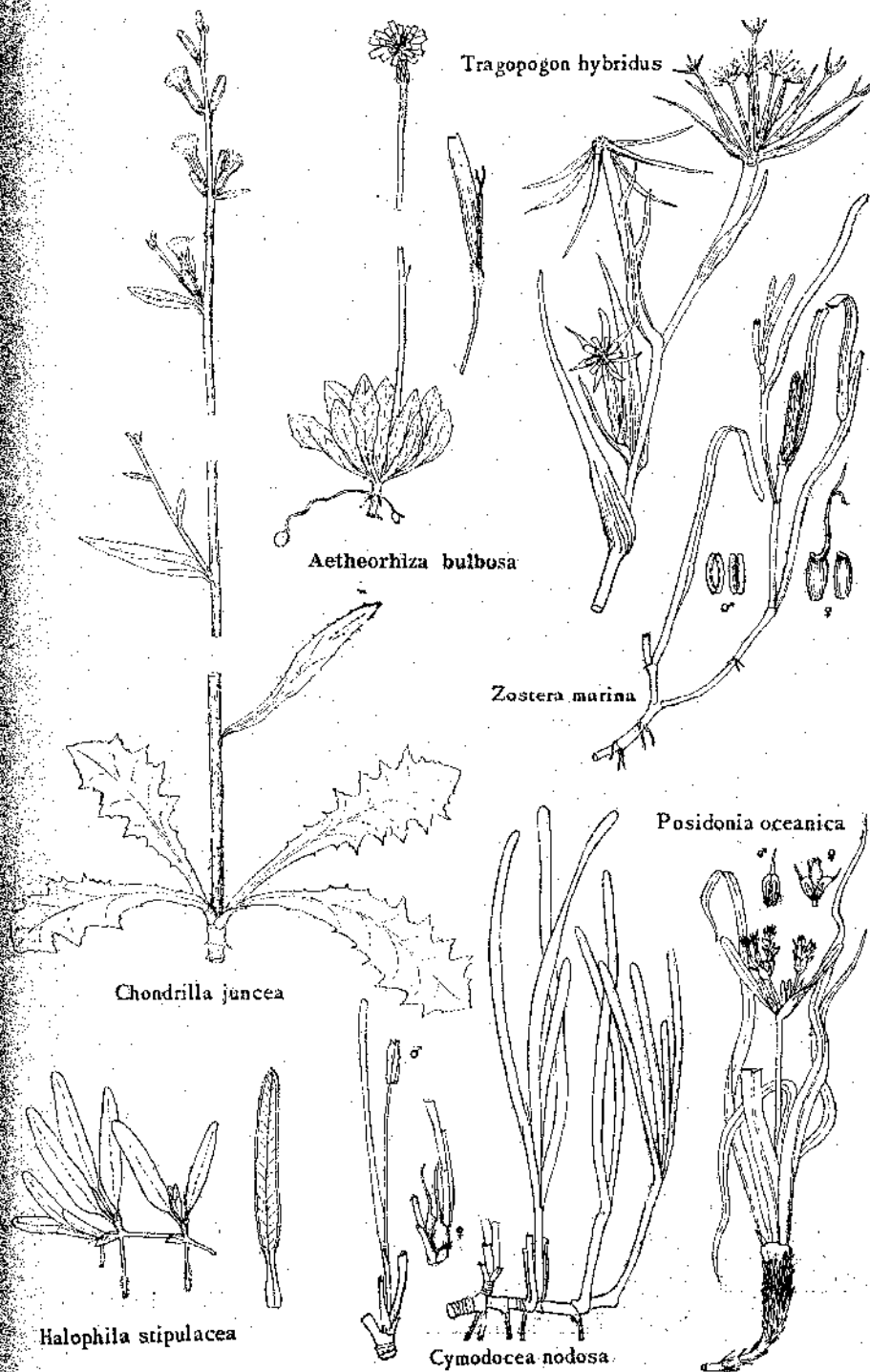
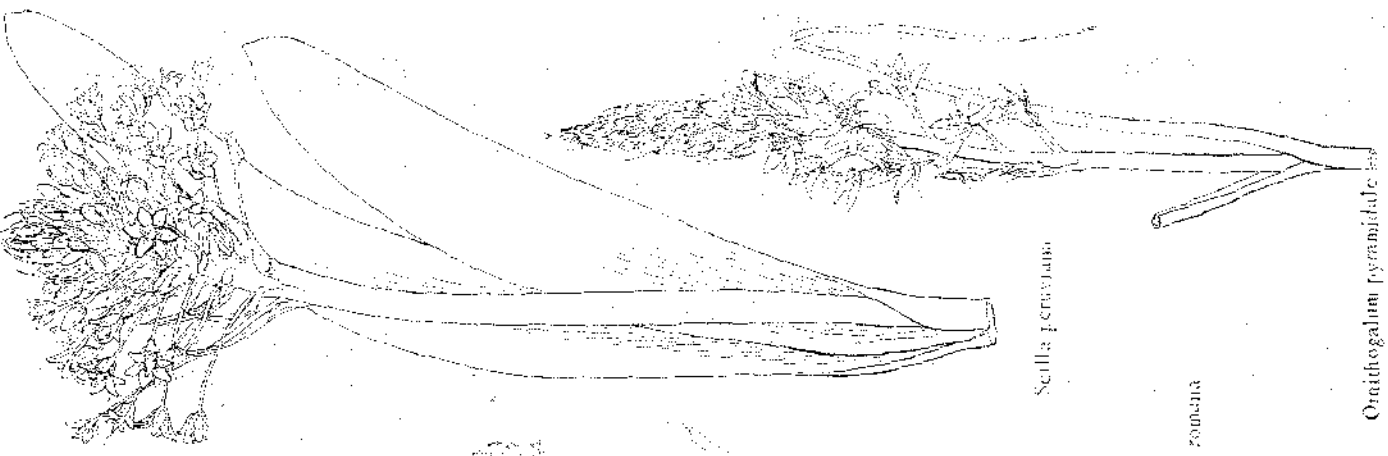


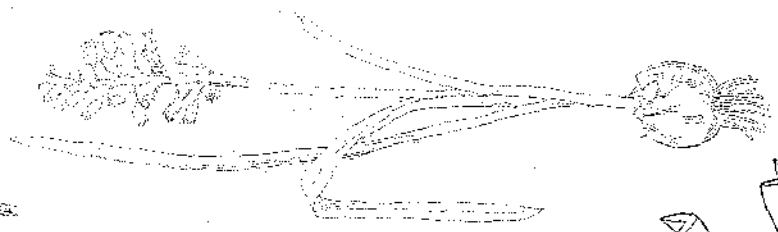
Plate LI



Scilla peruviana

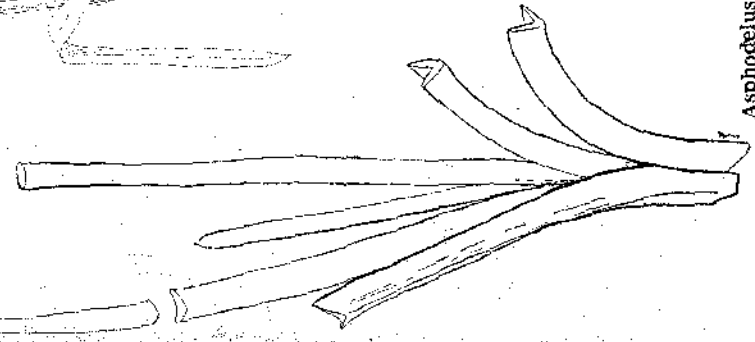
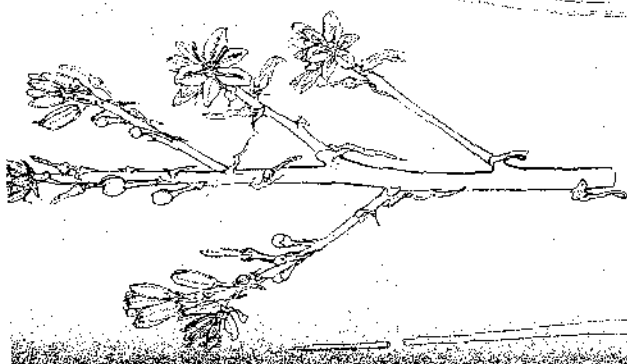
Ornithogalum pyramidale
subsp. *marbonense*

Plate LIII

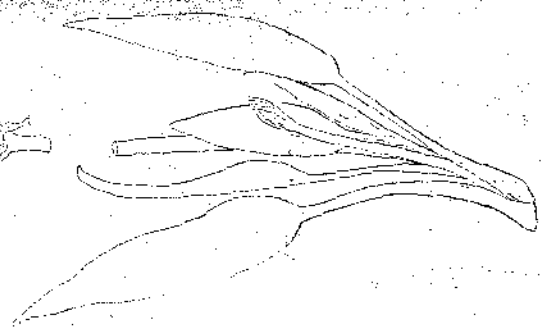


Bellevalia zonaria

Asphodelus aestivus



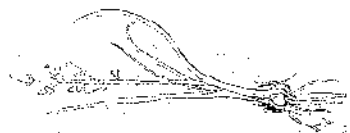
Alisma lanceolata



Dumortiera alisma



Triglochin laxiflorum



Allium subhirsutum

Plate LII



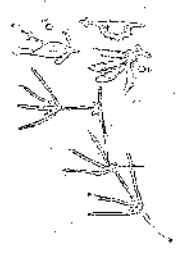
Colchicum cupani

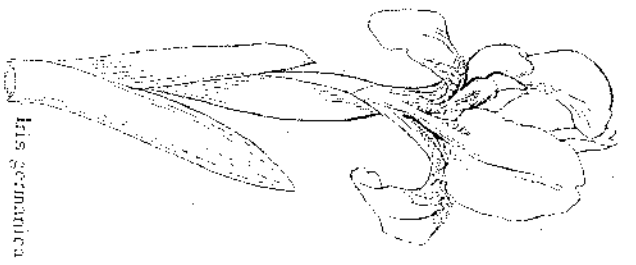


Ruppia maritima



Zanichellia palustris

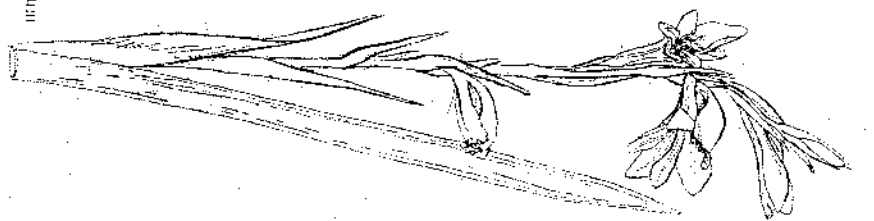




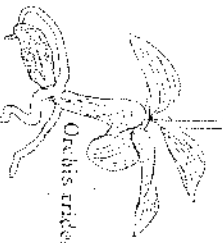
Iris germanica



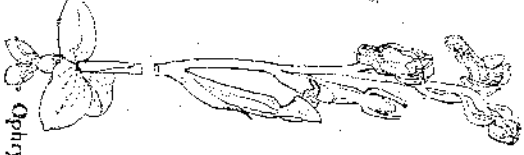
Gladiolus segetum



Anacamptis pyramidalis



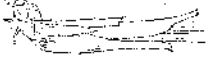
Orchis tridactyla



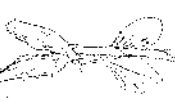
Ophrys fusca

Plate LIV

Juncus acutus



Spiranthes spiralis



Freesia refracta



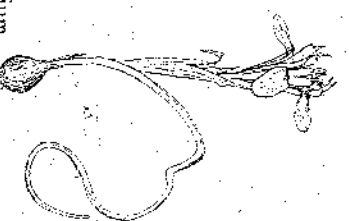
Scirpus parviflorus



Urginea maritima



Tulipa australis



Iris sisyrinchium

Plate LV

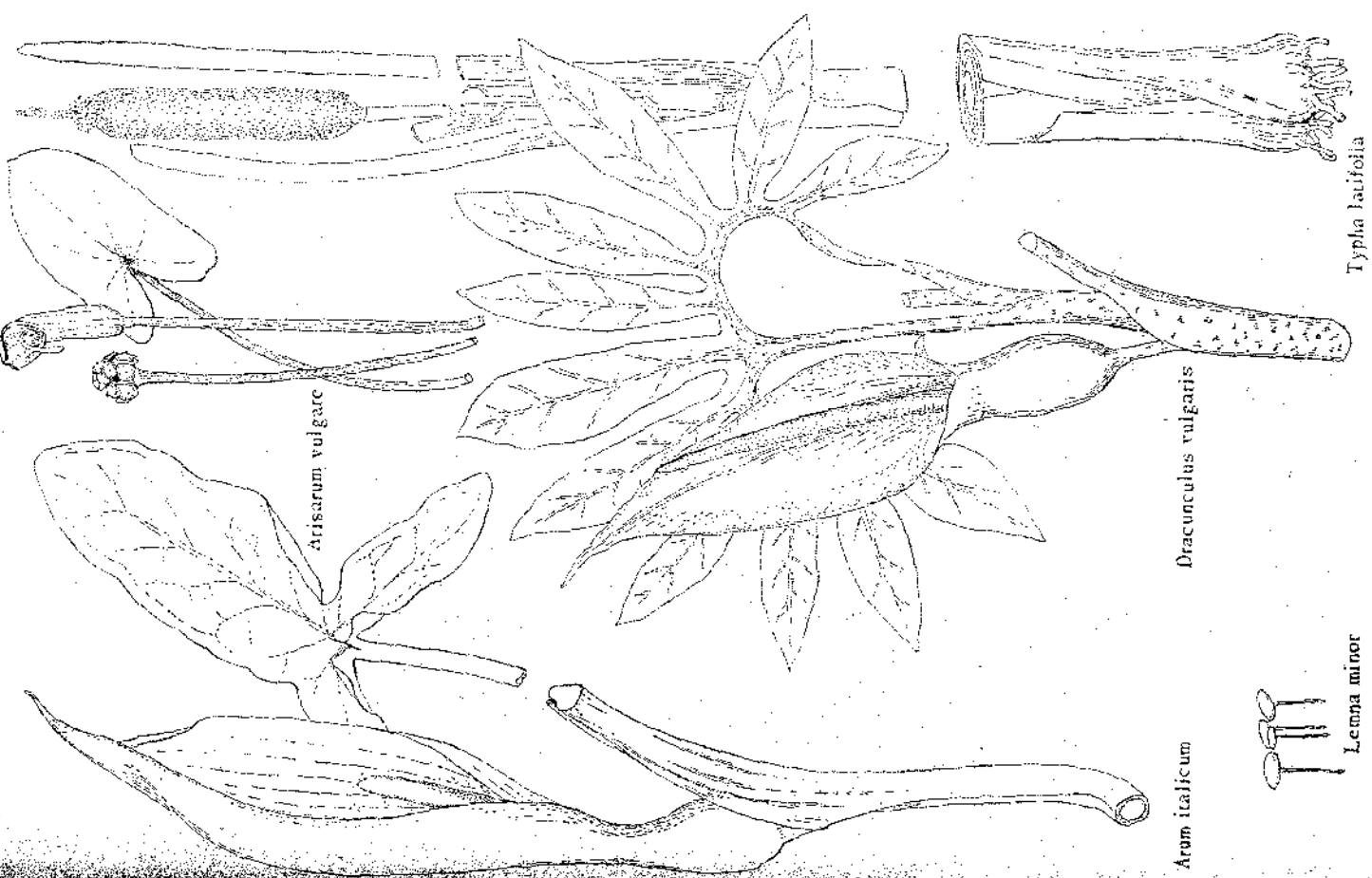


Plate LVII

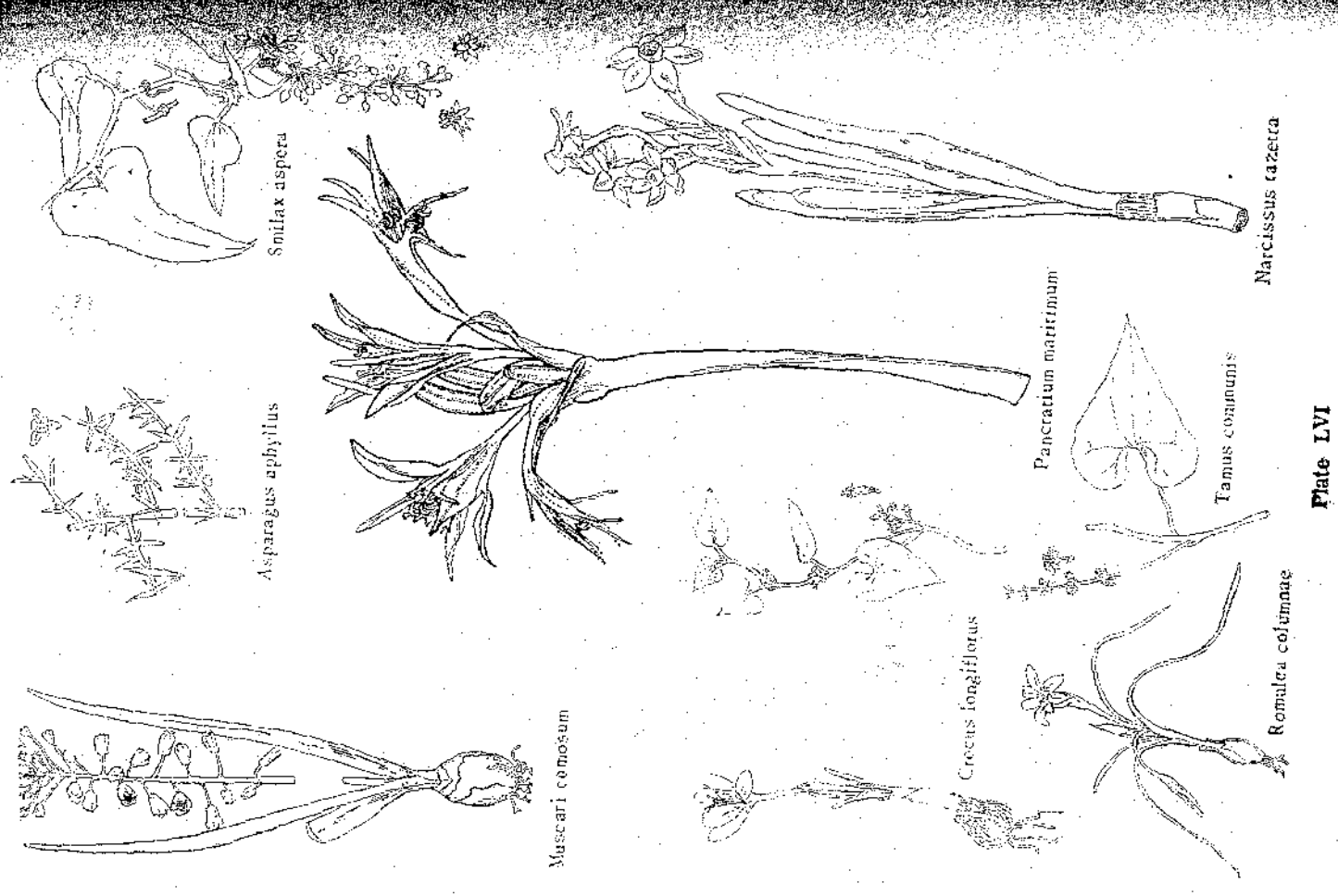
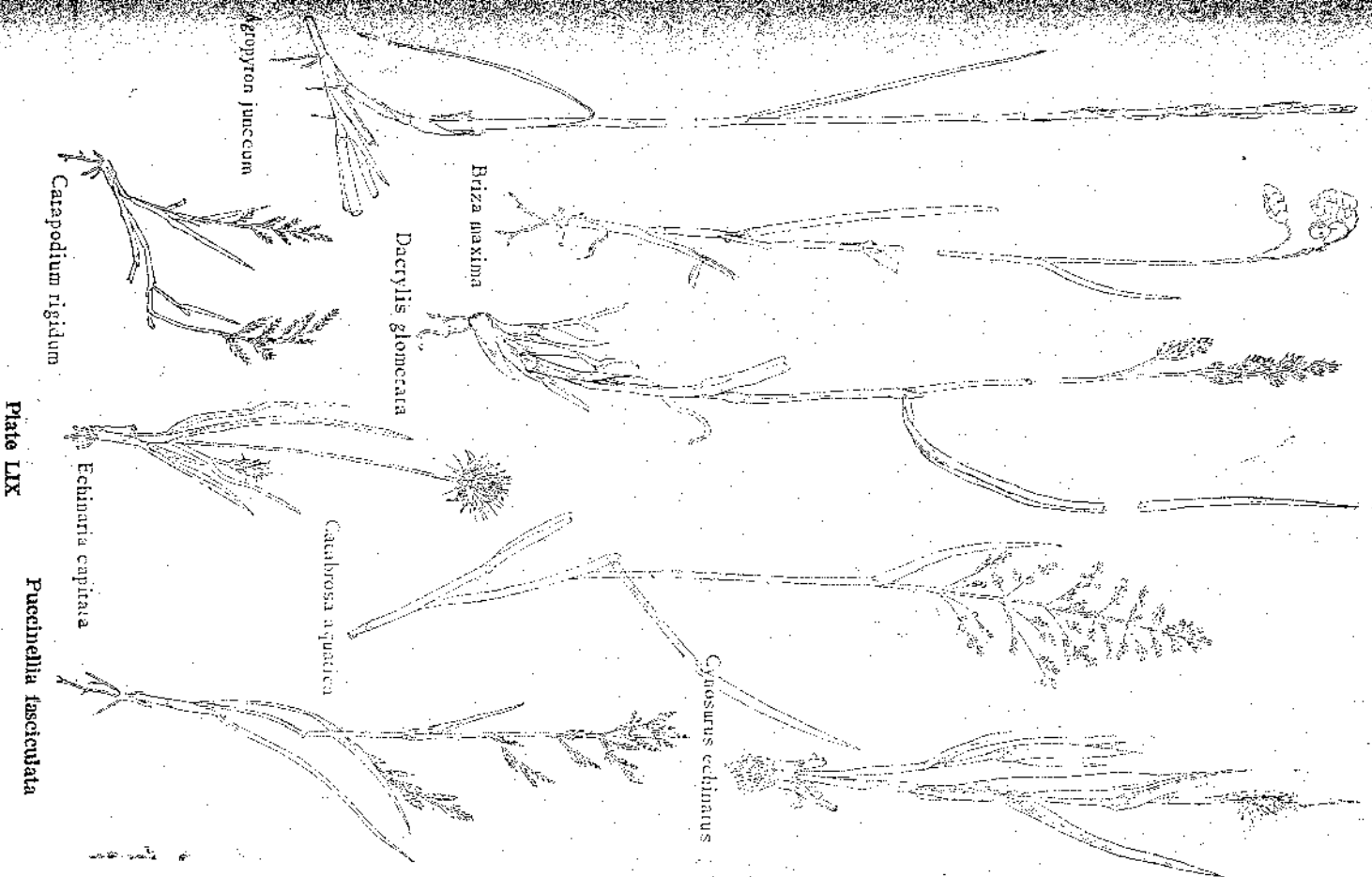
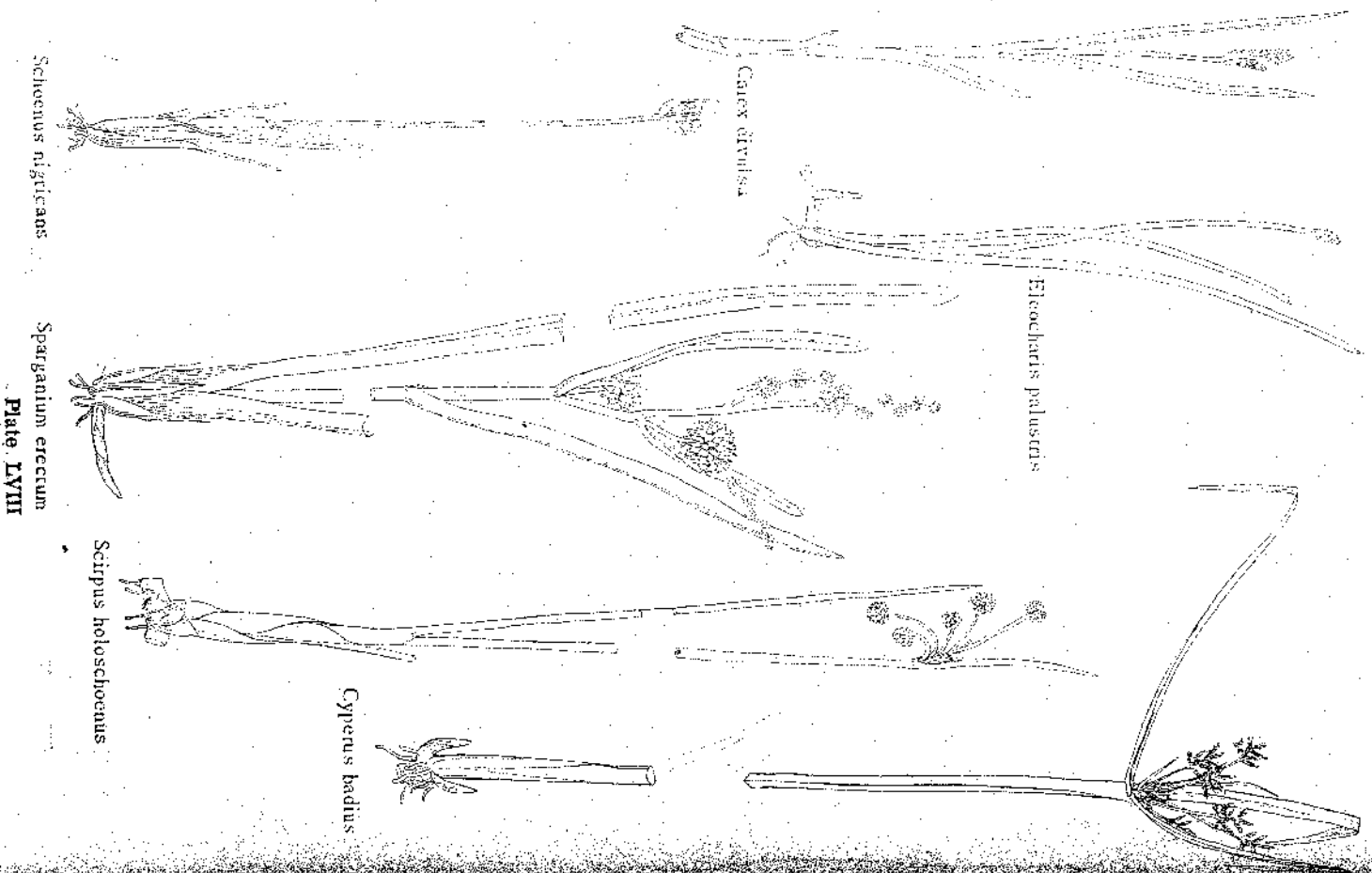
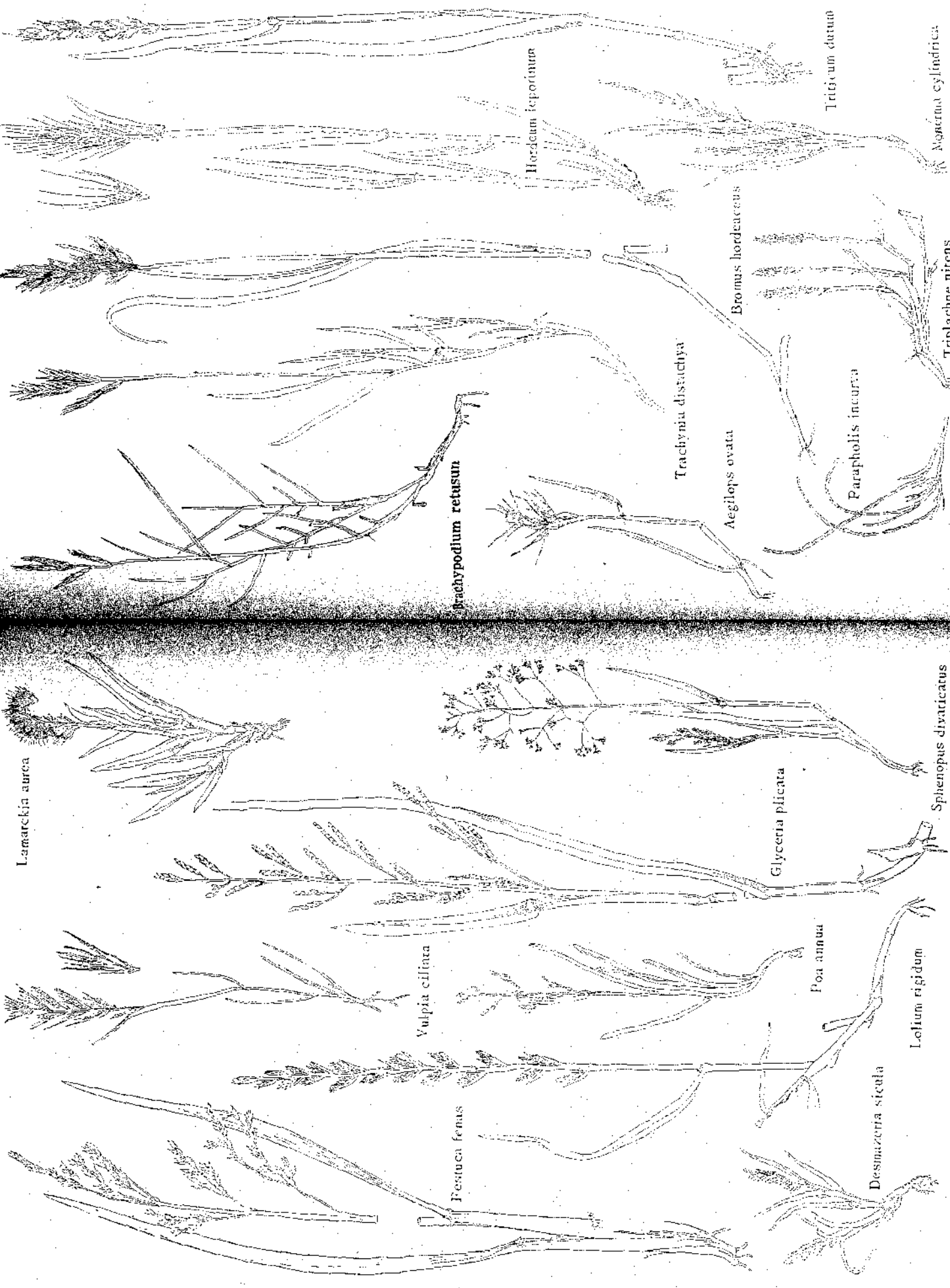


Plate LVI





Lamarkia aurea

Vulpia ciliata

Festuca tenax

Trachypodium retusum

Glyceria plicata

Poa annua

Desmazeria sicula

Lolium rigidum

Aegilops ovata

Trachypodium distachya

Bromus hordeaceus

Parapholis incurva

Triplachne nitens

Trisetum durum

Agrostis cylindrica

*Aira
cyparissia*

Melica minuta

*Anthoxanthum
gracile*

Cermetopis cucullatum

Avena barbata

Gastridium ventricosum

Polypogon semiverticillatus

Polypogon transspoliensis

Plate LXII

Calamagrostis minor

Oryzopsis miliacea

Calamagrostis

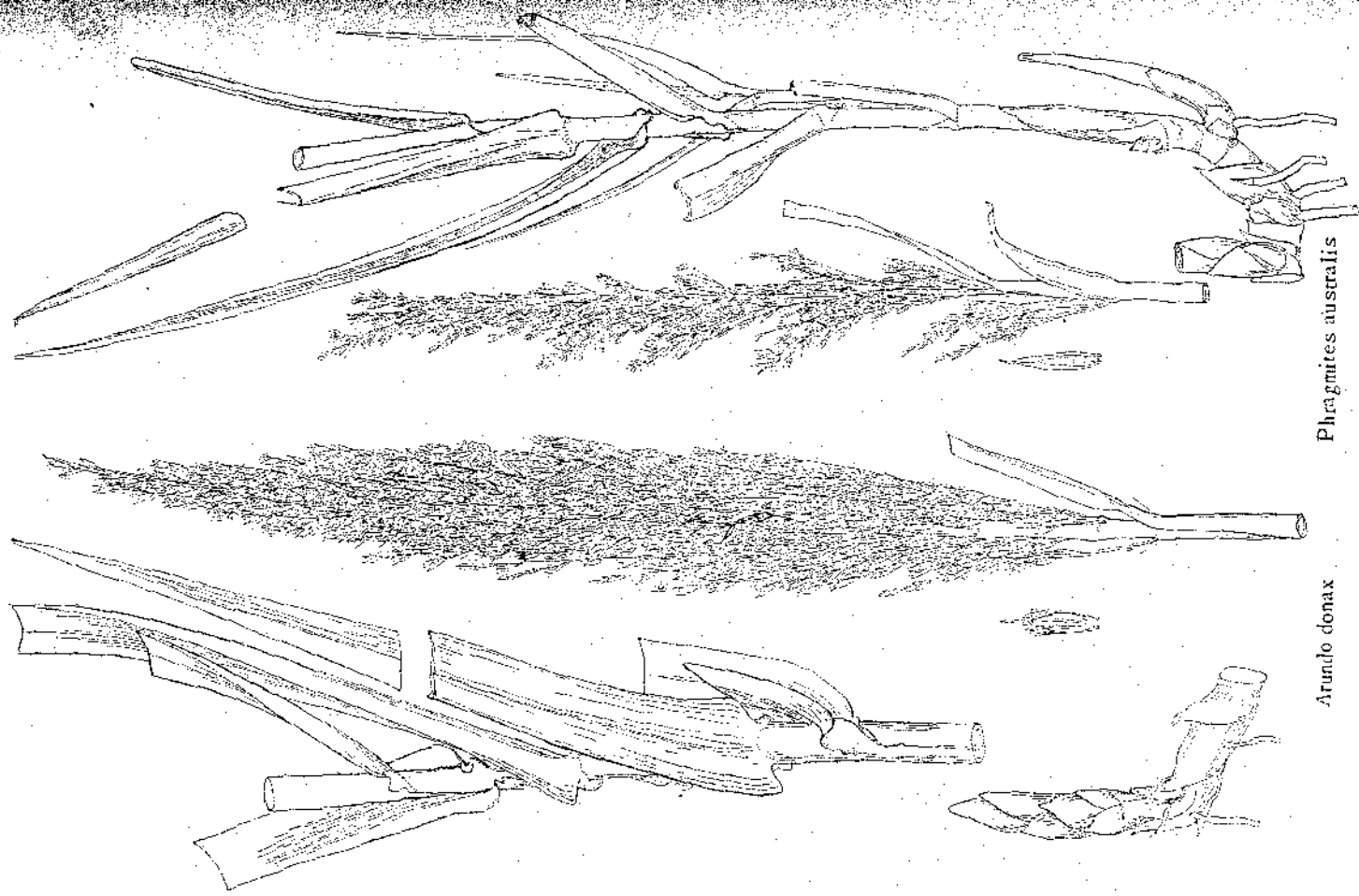
Aeluropus lagopoides

Plate LXIII

Ammophila arenaria

Lophochloa phleoides

Schismus arabicus *Trisetum aureum*



Arundo donax

Phragmites australis

Plate LXIV



Panicum repens

Cynodon dactylon

Digitaria sanguinalis

Echinochloa colonum

Sporobolus acenarius

Crypsis aculeata

Eragrostis ciliaris

Plate LXV

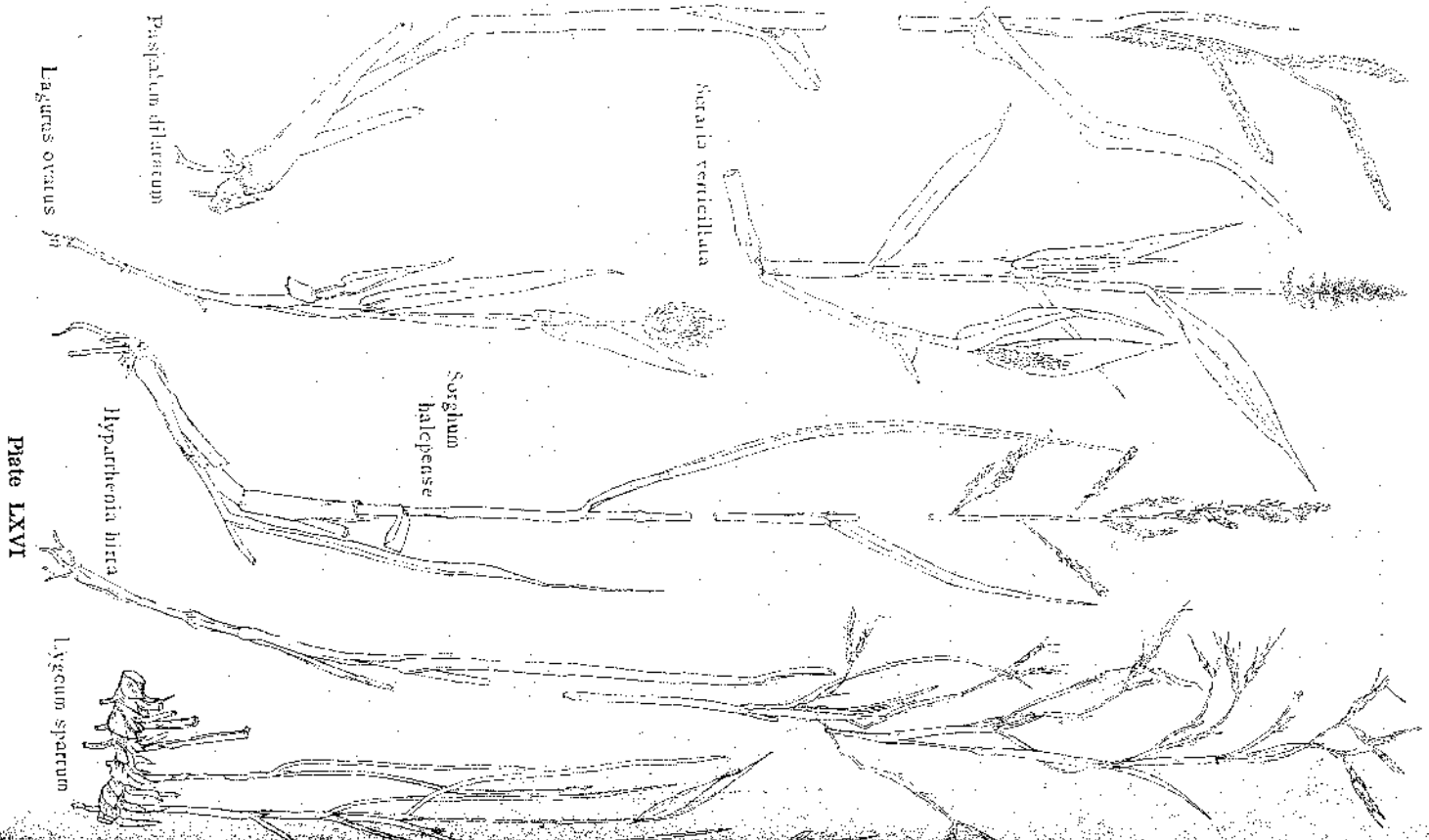


Plate LXVI

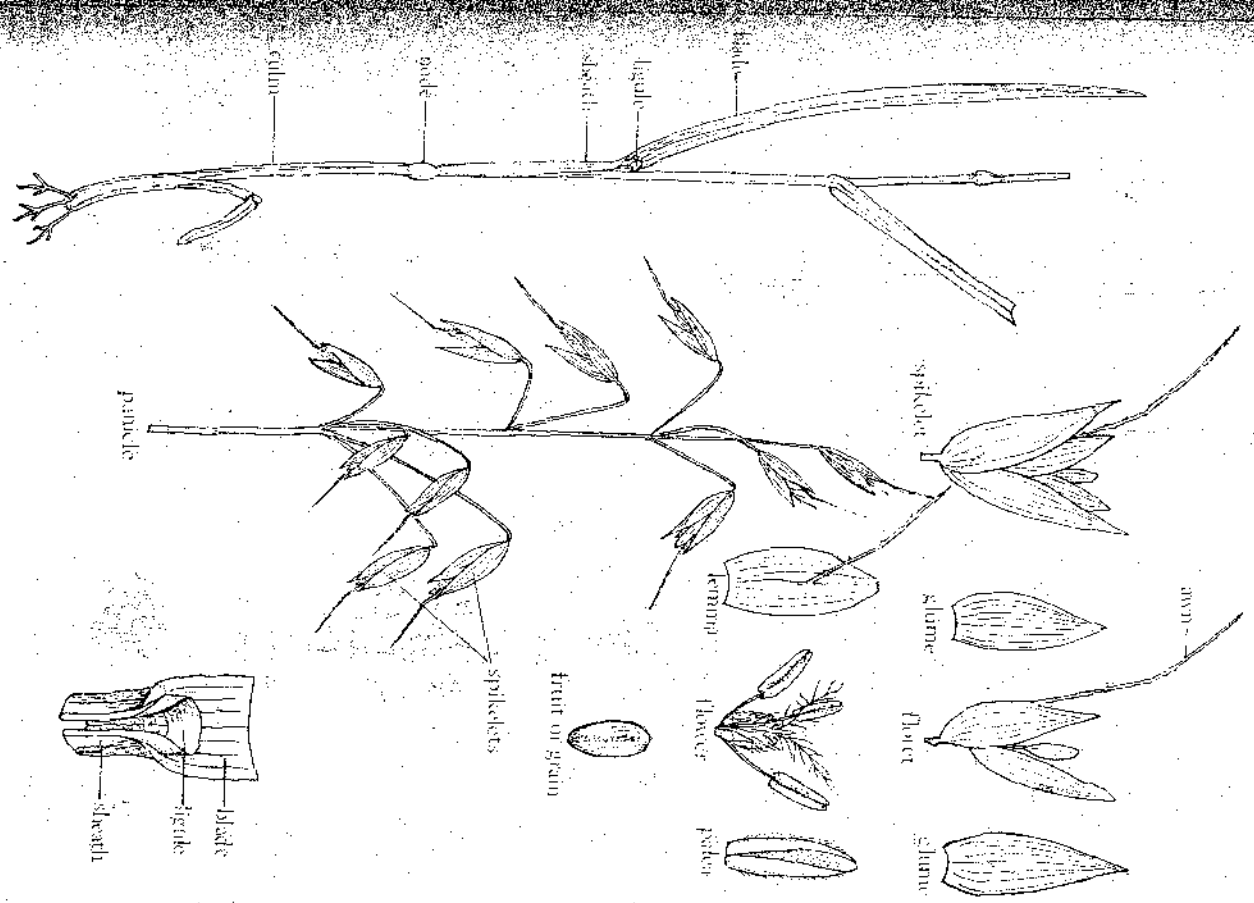


Fig. 27. Structure of grasses as in *Avena sativa* — Common Oat.

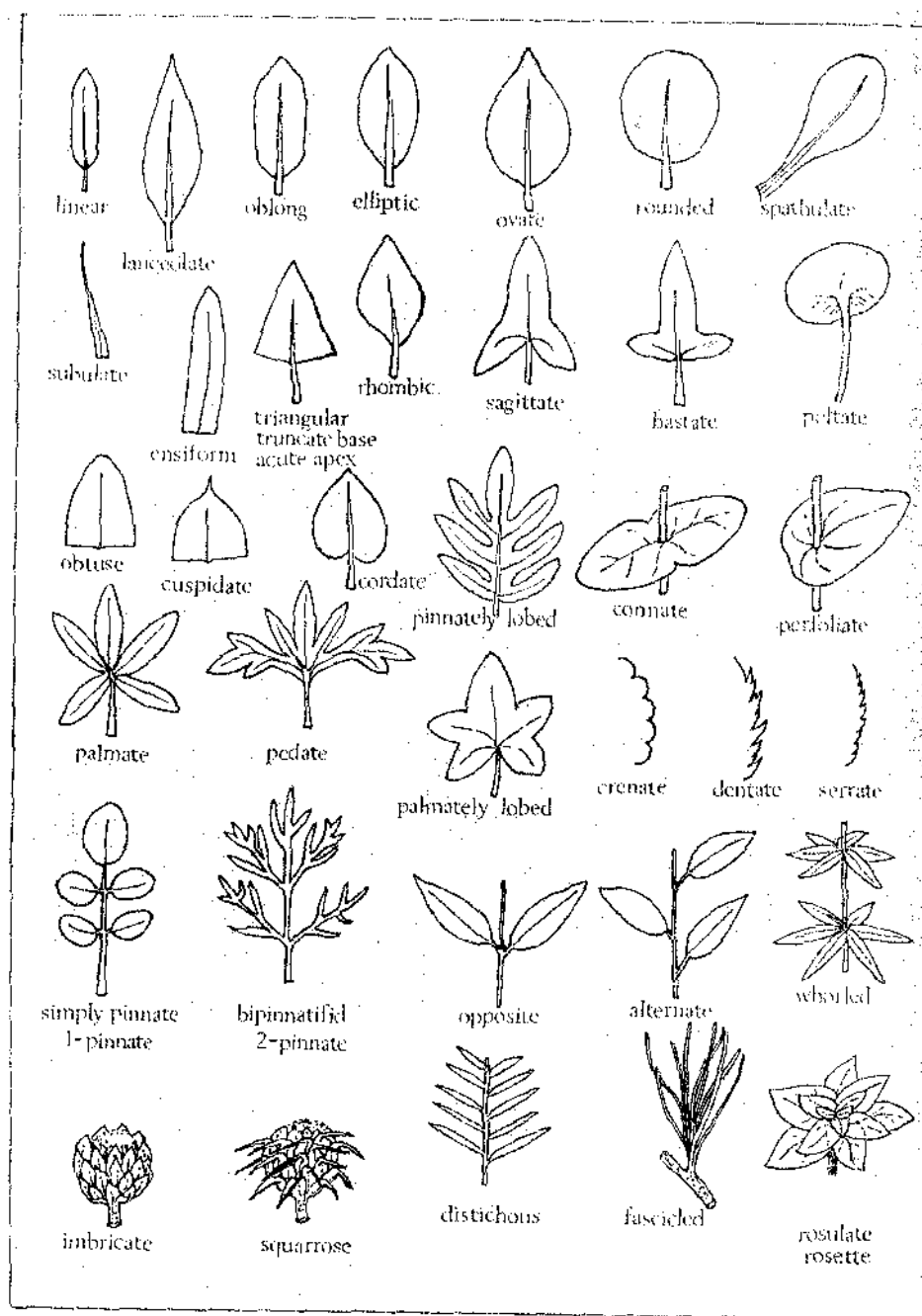


Fig. 28. Leaf shapes and arrangements.
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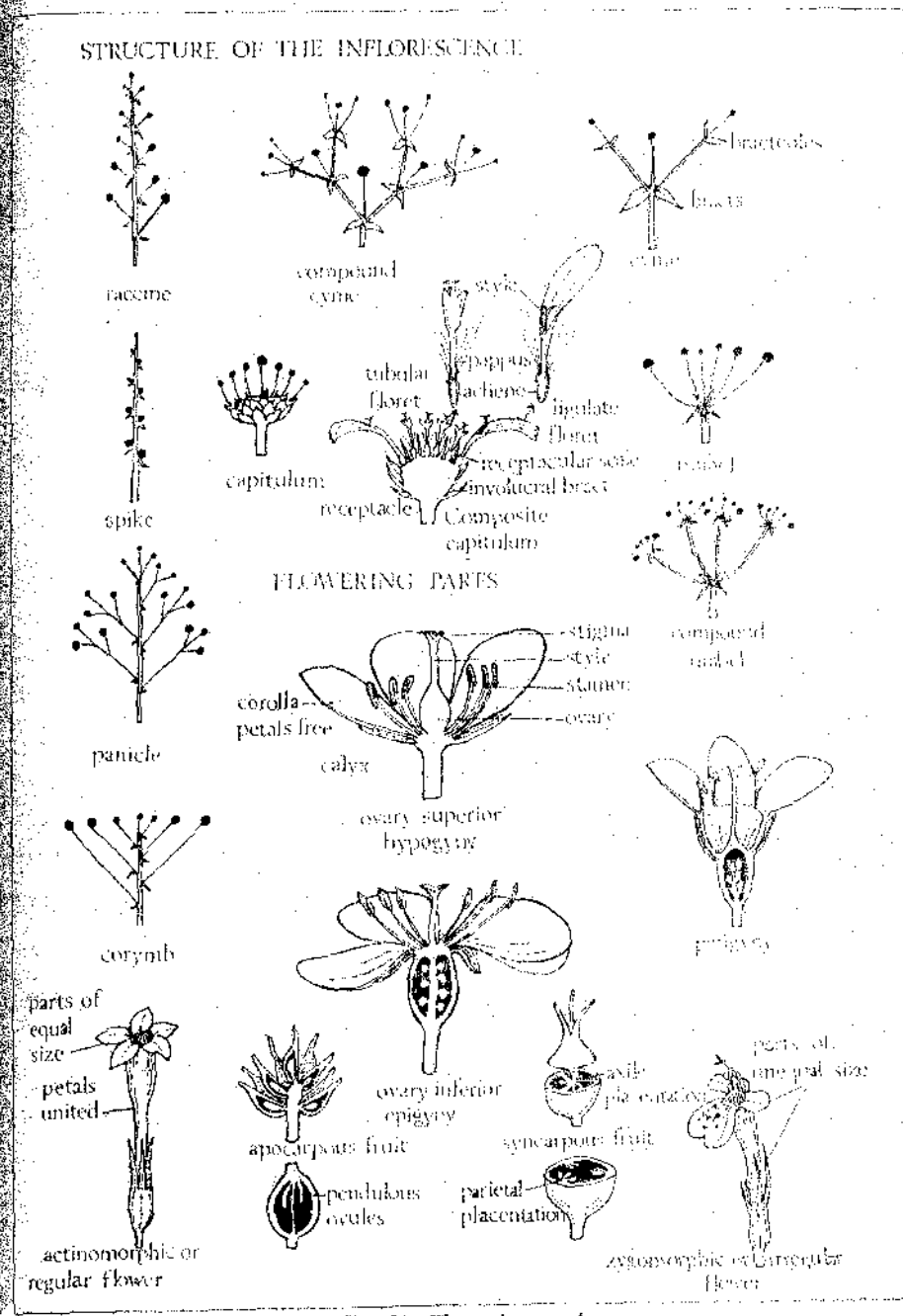


Fig. 29. Flowering parts.
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GLOSSARY

abbreviated Shortened, as when one part is shorter than another.
 abortion The arrested development of an organ.
 absciss layer A layer of separation, especially with reference to leaf-fall.
 acaulescent Stemless or apparently stemless.
 accidental Plants introduced by accident.
 accrescent Becoming larger after flowering (usually applied to the calyx).
 accumbent Lying against something else.
 achene A small, dry, indehiscent, one-seeded fruit in which the ovary wall is free from the seed (see Fig. 29).
 acicle A slender prickle.
 acid A term used to describe a soil deficient in lime (and frequently other nutrients also), with a pH below 6.
 acrid Bitter and hot to the taste; pungent, stinging.
 actinomorphic With radial symmetry; having more than one plane of symmetry (see Fig. 29).
 aculeate Prickly, with slender prickles or sharp points.
 acumen The point of an acuminate leaf.
 acuminate Abruptly tapering to a point.
 acute Pointed (see Fig. 28).
 adaxial With side or face next to the axis; ventral.
 adhere Attach or join, though naturally or normally separate; adnate.
 adnate With unlike parts (congenitally) grown together.
 adult Fully grown; having reached the age of maturity.
 adventitious Organs arising from abnormal positions (eg. buds from a root or roots from stem or leaf); plants recently introduced.
 aerial Used for plants (or parts of plants) living above the surface of the ground or water.
 aestival Belonging to summer.
 aestivation The arrangement of the parts of a flower in the bud.
 aggregate Assembled; collected together.
 alar Wing; a membranous projection; describing cells in the basal angle of a leaf.
 alien Believed on reasonable evidence to have been introduced.
 alternate Any arrangement of leaves or other parts not opposite or whorled, placed singly at different heights on the axis or stem (see Fig. 28).
 alternation of generations The reproduction by organisms which resemble the grandparent rather than the parent, applied especially to the regular succession of sexual (haploid, gametophyte) and asexual (diploid, sporophyte) phases as in ferns etc.
 alveolate With pits or depressions suggesting honey-comb.
 amphibious Capable of living on land or in water.
 amphitropous Turned both ways; applied to an ovule with hilum intermediate between the micropyle and chalaza.
 amplexicaul Clasping (usually the stem).
 anastomosing Joining up to form loops (usually applied to veins of leaves).
 anatropous The ovule reversed with micropyle close to the side of the hilum and the chalaza at the opposite end.
 anemophilous Said of flowers pollinated by wind.
 angle A corner; often referring to the meeting of two planes to form an edge or an angular stem.
 angustiseptate Fruit with the septum across the narrowest diameter.

annual Completing its life cycle in one year.
 annular Said of any organs arranged in a circle.
 annulus In ferns, the line or patch of thickened cells which bursts the sporangium; in *Equisetum* the sheath below the fruit spike; the fleshy rim of the corolla in *Asclepiadaceae*.
 antepetalous Opposite the petals.
 anterior Front; on the front side; away from the axis (stem); towards the subtending bract.
 antiseptalous Opposite the sepals.
 anther The part of the stamen which bears the pollen.
 antheridium An organ or receptacle in cryptogams in which male sex cells are produced.
 antheriferous Anther-bearing.
 anthesis Flowering; strictly the time of expansion of flower, but often used of the flowering period.
 apetalous Without petals.
 apex Tip.
 apical Pertaining to the apex (tip).
 apiculate Having a minute, pointed tip.
 apiculus A short point.
 apocarpous With carpels free from each other (see Fig. 29).
 apomictic Reproducing by seed not formed from sexual fusion.
 appendage A process (protruberance); a part added to another, as leaves are appendages to the stem.
 appendiculate With an appendage.
 appendix (See appendage).
 appressed Lying flat against an organ.
 aquatic Living in water.
 arachnoid Covered with or formed of cobweb-like hairs or fibres.
 archegonium The organ or receptacle in which the ova are produced in the higher cryptogams and some gymnosperms.
 archipelago A group of islands.
 arcuate Moderately curved, bent like a bow.
 areole A space marked out on a surface.
 arid Dry, parched, withered, barren.
 aril An appendage or an outer covering of a seed growing out from the hilum or funicle.
 arista Awn, bristle.
 aristate Awned; provided with a bristle at the end, sometimes on the back or edge.
 aromatic Fragrant, spicy, pungent.
 articulate Jointed with nodes or joints, or places where separation takes place naturally.
 ascending Rising up; produced somewhat obliquely, or indirectly upward.
 astringent Harsh; binding, constrictive.
 asymmetric Irregular in outline or shape; used of a flower which cannot be divided in any vertical plane into two similar halves (sometimes used incorrectly as a synonym for zygomorphic); dissimilarity of the number of the members in calyx, corolla, androecium or gynaecium.
 attenuate Long-tapering.
 auricle An ear; applied to ear-like lobes at base of leaf-blades, and to small lobes at the tip of the leaf sheath in many grasses.
 auriculate With ear-like appendages.

awl-like Narrow and sharp-pointed; gradually tapering from base to a slender or stiff point.

awn A bristle-like appendage, especially those on glumes of grasses (see Fig. 27).

axil The upper angle formed between the axis and any organ that arises from it.

axile In the axis, said ordinarily of the placentae in the ovary (see Fig. 23).

axillary Situated in the axil; of placentation (see axile).

axis The main stem; the main or central line of development of any plant or organ.

barb A hooked hair, a sharp process curving back from a point.

barbellate Furnished with barbellae or short stiff hairs.

bark The outer coverings of the woods, all tissues outside the cambium; frequently restricted to the periderm.

basal At the base of an organ or part.

basifixed Attached or fixed by the base.

beak A prominent and substantial projection; particularly a prolongation of a fruit or carpel.

bearded Bearing or furnished with long or stiff hairs.

berry A simple fruit with a pulpy or fleshy ovary wall.

bi- Two.

biennial Of 2 seasons' duration from seed to maturity and death.

bifurcation Division into two forks or branches; the point of division; the branches, or one of them.

bilateral Arranged on opposite sides.

bisexual Hermaphrodite; both sexes on the same individual.

bitter Obnoxious, the opposite of sweet; harsh, stinging.

bitumen Pitch, describing natural more or less oxidised hydrocarbons (such as naphtha, asphalt, petroleum).

blooming Flowering.

blotched Colour irregularly disposed in patches.

body The whole material organism; the main, central or principal part.

bordered Having a margin distinct in colour or texture from the rest.

borne Carried, sustained.

bract A modified leaf subtending a flower, peduncle or branch (see Fig. 29).

bracteate With bracts.

bracteiform Bract-like.

bracteolate With bracteoles.

bracteole A modified leaf subtending a flower or pedicel (see Fig. 29).

branch A lateral division of the stem, or axis of growth.

bud An embryonic axis with its appendages.

bulb A modified bud, long-lasting, usually underground.

bulbil A bulb arising from the mother bulb.

bulbous Having the appearance of a bulb.

bullate Blistered or puckered on the surface.

caducous Falling off early, as the sepals of some plants.

caespitose Growing in tufts.

calcareous Composed of or containing lime or limestone.

calcicole Growing best in a soil with a high lime content.

calcifuge Growing best in a soil with a low lime content.

calcite The native crystallized rhombohedral anhydrous carbonate of lime (calcium carbonate), which exists in a variety of forms.

callose Bearing callosities; hard and thick in texture.

callosity A hardened thickening.

callous With the texture of a hard protuberance or roll of new covering tissue.

calyx; (calyces) The outermost whorl of the floral parts (see Fig. 29).

calycine Of the calyx.

campanulate Bell-shaped.

campylotropous Said of an ovule or seed which is curved in its formation so as to bring the micropyle or true apex down near the hilum.

canal Channel.

canaliculate Longitudinally channelled.

canescent Hoary, usually with grey pubescence.

capillary Hair-like, very slender.

capitate In heads; aggregated into a very dense or compact cluster.

capitulum A little head; a close head of sessile flowers (see Fig. 29).

capsule A simple dry fruit, the product of a compound ovary splitting along two or more lines of suture.

carinate Keeled.

carpel A simple ovary; one unit of a compound ovary.

carpopore A portion of receptacle prolonged between the carpels as in *Umbelliferae*.

cartilaginous Resembling cartilage in consistency; tough.

caruncle An appendage at or about the hilum of the seed.

carunculate With a caruncle.

caryopsis The naked grass-fruit or grain in which the seed coat is united with the ovary wall.

castaneous Chestnut-coloured.

casual An introduced plant which has not become established though it occurs in places where it is not cultivated.

catch crop A quick-maturing crop, usually vegetable, which is grown between the seasonal main crops, or under long-lived main crops.

catkin A flexible, usually drooping scaly spike bearing petalous, unisexual, wind-pollinated flowers.

caudate Having an appendage resembling a tail.

caudicle A cartilaginous strap which connects certain pollen-masses to the stigma, as in orchids.

caulescent More or less stemmed or stem-bearing, having an evident stem above ground.

cauliferous Bearing a stalk.

cauline Pertaining or belonging to the stem.

cell Any structure containing a cavity, as the cell of an anther or ovary; locule.

centrifugal An inflorescence flowering from the inside outward, or from top to base.

centripetal An inflorescence flowering from the outside inward, or from the base upward.

chalaza That part of the ovule or seed in which the nucellus joins the integuments; the base of the nucellus, always opposite the upper end of the cotyledons.

chartaceous Of papery texture.

chlorinity Saltiness, as estimated in chloride content, sea salt being composed mainly of sodium chloride.

chlorophyll The green colouring matter in the cells of autotrophic plants.

chromosomes Microscopic bodies found in the nuclei at the time of division. In the vegetative cells two sets of these are normally present, their number, when known, is given as $2n$ at the end of descriptions.

cilia Marginal hairs.

ciliate Said of a margin fringed with hairs.

cillolate Said of a margin fringed with small hairs.

circumscissile Opening or dehiscing along a horizontal line around the fruit or anther, the valve usually coming off like a lid.

cistern An artificial reservoir for water or other liquid; a natural reservoir or depression containing water.

cladode A branch simulating a leaf; a green more or less leaf-like lateral shoot.

clathrate Latticed.

clavate Club-shaped, thickened at one end.

claw The long narrow stalk-like base of the petals or sepals in some flowers.

cleft Divided into lobes separated by narrow or acute sinuses which extend more than halfway to the midrib.

cleistogamous With fertilization occurring within the unopened flower.

climber A plant ascending by using other objects as supports.

cluster Compact; flowers arranged closely together.

coalescent Union of like parts or organs.

coarse Wanting in delicacy of texture, granulation or structure; consisting of comparatively large parts or particles.

cochleariform See cochleate.

cochleate Spoon-shaped; describes a form of imbricate aestivation with one part exterior.

coherent Two or more similar parts or organs joined.

coil Twisted in a circular spiral or winding shape, wound round.

column A combination of stamens and styles into a solid central body, as in orchids.

columnar Having the form of a column.

coma A tuft of hairs at the end of an organ.

commisure The place of joining or meeting, as the face by which one carpal joins another.

comose Bearing a tuft or tufts of hair.

compact Closely joined or pressed together.

compound Similar parts aggregated into a common whole.

compressed Flattened, especially flattened laterally.

concave Hollow, as the inside of a saucer.

concentric Having a common centre.

concolorous Of uniform colour.

condescent Growing together; coalescent.

condensed Making dense.

condiment Anything of pronounced flavour used as a relish, or to stimulate the appetite.

cone The fruit of a pine, fir tree, cycad etc., with scales forming a strobilus; an inflorescence or fruit with overlapping scales.

confluent Blended into one, passing by degrees from one into another.

congested Crowded.

conical Having the form of a cone, as the carrot.

connate United congenitally or subsequently (see Fig. 28).

connective The portion of a stamen distinct from the filament which connects the two lobes of an anther.

connivent Coming together or converging, but not organically connected.

conspicuous Clearly visible, obvious or striking to the eye.

constricted Drawn together, contracted.

contiguous Touching each other at the edges.

contorted Twisted or bent; in floral parts when in a whorl one edge of a part overlaps the next (sepal, petal, etc.), while the other edge is overlapped by a preceeding part.

contracted Said of inflorescences that are narrow and denser, the branches short or appressed.

convergent Said of two or more organs with their bases wide apart, but their apices approaching one another.

convex Having a more or less rounded surface.

convolute When one part is rolled round another.

coralline A pocene deposit containing fossil Polyzoa and Mollusca.

cordate Heart-shaped; said of leaves having the petiole at the broader and notched end (see Fig. 28).

coriaceous Like leather.

coron A solid bulb-like stem, usually subterranean, as in *Crocus* and *Gladiolus*.

corniculate Furnished with a little horn or horns.

corolla The inner floral whorl, composed of separate or connate petals (see Fig. 29).

corona Crown; any appendage between the corolla and stamens, or on the corolla (as in *Narcissus*), or that is the outgrowth of the staminal part or circle.

coroniform Crown-shaped.

coronula A small crown or coronet surmounting a seed etc.

corrugated Wrinkled.

corymb Short and broad, more or less flat-topped, indeterminate flower cluster, the outer flowers opening first (see Fig. 29).

corymbose Arranged in corymbs.

cosmopolitan Distributed throughout the world.

costa A rib, as a midrib.

cotyledon Seed leaf, the primary leaf or leaves in the embryo.

crenate Said of a margin with rounded or blunt teeth (see Fig. 28).

crenulate Finely crenate.

crest Raised and irregular toothed ridge.

crispate Curled.

crystal A mineral solid, usually of regular faces or angles, found in the tissues of plants; of very various composition.

hooded Hooded or hood shaped.

culm The flowering stems of grasses (see Fig. 27).

cultivar A variety or race that has originated and persisted under cultivation, but not necessarily referable to a botanical taxon.

cuneate Wedge-shaped; triangular, with the narrow end at the point of attachment.

cupuliform Cup-shaped.

cuspidate Tipped with a sharp, rigid point (see Fig. 28).

crathiform Cup-shaped.

cyathium The ultimate inflorescence of *Euphorbia*, consisting of a cup-like involucre bearing the flowers from its base.

cylindrical Elongated with a circular cross-section.

cymbiform Boat-shaped.

cyme A broad, more or less flat-topped determinate flower-cluster, with central flowers flowering first (see Fig. 29).

cymose Cyme-like.

deciduous Not persistent; said of leaves falling in autumn or of floral parts falling after anthesis.

decorticated Deprived of bark.

decumbent Reclining or lying on the ground, but with the ends ascending.

decurrent Said of a leaf or leaf scar, part of which extends in a ridge down the twig below the point of insertion.

decussate In pairs alternately crossing at right angles.

definite Precise; of a certain number; applied to an inflorescence it means the ends in a flower.

deflexed Bent or turned abruptly downward.

dehiscence To open spontaneously when ripe, as seed capsules.

dehiscent That which dehisces, as the opening of an anther or fruit along regular lines of suture.

delicate Fine, soft, slender or slight; of colour, subdued; weakly, fragile; subtle in its fineness.

deltate Shaped like the Greek Triangle; an equilateral triangle.

demarcation Marking the limits of, delimitation, separation.

dense Close together.

dentate Said of a margin with teeth pointing outward or downward (see Fig. 28).

denticulate Minutely or finely dentate.

depauperate Reduced or undeveloped, impoverished, dwarfed.

depressed More or less flattened.

dichasium A cyme with two lateral axes.

dichotomous Branching by constantly forking in pairs.

dictyostele A stele with large overlapping leaf-gaps.

didymous Found in pairs; divided into two lobes.

didynamous Said of four-stamened flowers with stamens in pairs, two long, two short, as in *Labiatae*.

diffuse Loosely branching or spreading; of open growth.

digitate Finger-like; compound with the members arising from one point.

dilated Widened.

dimorphic Occurring in two forms.

dioecious Unisexual, the male and female elements in different plants.

diploid A plant having two sets of chromosomes in its nuclei; similarly tetraploid plants having four sets of chromosomes in their nuclei.

disarticulating Fracturing at the nodes as does the axis of the spikelets of many grasses.

disc Development of the torus within the calyx or within the corolla and stamens; the central part of a capitulum in *Compositae* as opposed to the ray; the base of a pollinium; the expanded base of the style in *Umbelliferae*; in a bulb the solid base of the stem around which the scales are arranged.

discolorous Used when the two surfaces of a leaf are unlike in colour.

disk See disc.

disposition Arrangement.

dissected Deeply divided, or cut into many segments.

distal The converse of proximal; remote from the place of attachment.

distant Said of similar parts not closely aggregated; remote.

distichous Two-ranked, in two rows (see Fig. 28).

divaricate Widely divergent.

diverge Incline away from each other.

diverse Varied, multiform, diversified.

dorsal Relating to the back, or attached thereto; the surface turned away from the axis; opposed to ventral.

dorsifixed Attached by the back.

dorsiventral With a distinct upper and lower surface.

drupe A fleshy one-seeded indehiscent fruit, with seed enclosed in a stony endocarp called a pip.

drupelet One drupe in a fruit made up of aggregate drupes.

dull Not clear, vivid or intense, obscure in colour.

dwarf Of small size or height compared with its allies.

ebracteate Without bracts.

ebracteolate Without bracteoles.

ecorniculate Without little horns.

edible Suitable for food.

effuse Spreading widely.

eglandular Without glands.

elaiosome Characteristic oily appendages and seeds of plants offering food to ants.

elater In *Equisetum*, four club-shaped hygroscopic bands, attached to the spores, which serve for dispersal.

ellipsoid An elliptical solid.

elliptical A flat part or body that is oval and equally narrowed at both ends (see Fig. 23).

elongated Stretched; lengthened.

emarginate With a shallow notch at the apex.

embedded Fixed firmly in a surrounding mass of material.

embryo The rudimentary plant formed in the seed.

enclosed Surrounded.

encrusted Covered with a crust or thin coating.

endemic Indigenous or native to.

endocarp The inner layer of a pericarp (ovary wall).

endosperm The albumen of a seed in angiosperms; in gymnosperms the prothallium within the ovule.

enfold Wrapped up in, enveloped in.

enlarge To increase the size of, to widen, to expand.

ensiform Sword-shaped, as in the leaf of *Iris* (see Fig. 28).

entangle Caught or impeded in a tangle, involved in networks etc. from which extrication is difficult.

entire Without toothing or division, with even margin.

entomophilous Said of a plant whose flowers are pollinated by insects.

ephemeral Short-lived, transitory; used for plants which are unable to persist.

epicalyx A series of bracts close to and resembling the calyx.

epidermis The true cellular skin or covering of a plant below the cuticle.

epigynous Borne on the ovary; said of floral parts in which the ovary is inferior and not perigynous (see Fig. 29).

epipetalous Borne upon the petals; placed before the petals.

equifoliate Equal-leaved.

erecto-patent Between spreading and erect.

ericoid *Erica*-like, like the heath.

erose Irregularly toothed or with an end as though bitten or gnawed.

escape A plant growing outside a garden, but not well naturalized, derived from cultivated specimens either by vegetative spread or by seed.

essential oil Volatile oils, composed of various constituents and contained in plant organs, with characteristic odour.

estrophiolate Without a caruncle (or strophiole).

evergreen Remaining green during its dormant season; said of plants that are green throughout the year.

excavate As though dug out.

exceeding Going beyond, longer than.

excentric One-sided, off-centre, abaxial.

exine The outer coat of a pollen grain.

exocarp The outer layer of a pericarp (ovary wall).

expanded Spread out; diffuse.

exstipulate Without stipules.

external Outer.

extrorse Facing on opening outward.

falcate Sickie- or scythe-shaped.

fallow An area of land left uncropped for a year or more.

family A group of genera.

farinose With a mealy covering.

fascicle A close cluster or bundle of flowers, leaves, stems or roots (see Fig. 28).
fasciculate In close bundles or clusters.
fastigate Parallel, clustered and erect.
fathom 6 feet.
fault (geological) A break in continuity of the strata, vertical dislocation of strata.
feathery Plumose; long hairs with side projections.
fertile Said of pollen-bearing stamens and seed-bearing fruits; capable of producing fruit.
fibre A thread, or threadlike structure; a long slender, thick-walled cell; the ultimate rootlets.
fibrous Having numerous woody fibres, as the rind of a coconut.
fid Cleft.
filament The part of a stamen that supports the anther; thread-like structure.
filiform Threadlike, long and very slender.
frimbria A fringe.
frimbriate Fringed, the hairs longer or coarser as compared with ciliate.
fine Exquisitely fashioned, delicate in structure or texture.
fissure A split.
fistulose Hollow-cylindrical, as the leaf and stem of an onion.
flabellate Fan-shaped, dilated in a wedge-shape, sometimes plaited.
flagelliform Resembling a runner.
flakey Lamelliform.
fleshy Succulent.
flexible Capable of being bent, but elastic enough to be able to resume its original shape.
flexuous Bent alternately in different directions.
floccose A shortly woolly surface usually composed of stellate hairs.
floret A small flower; one of a cluster as in *Compositae* (see Fig. 29) or *Gramineae* (see Fig. 27).
flower A modified plant structure concerned with the production of seeds in the angiosperms.
flush Suffused or adorned with glowing colour, made red; to shoot; a locality with added nutrient-rich water.
fluted Regularly marked by alternating ridges and groove-like depressions.
fodder Food for cattle, dried as hay and straw etc. unless described as "green fodder".
foetid Smelling strongly and disagreeably.
foliaceous Leaflike; said particularly of sepals, calyx-lobes, and bracts that in texture, size or colour look like leaves.
foliage The leafy covering, especially of trees.
-foliate -leaved.
-foliolate With leaflets.
follicle A single carpellate dry fruit dehiscing along one line of suture.
foveate With a depression or pit, as in the upper surface of the leaf base in *Isoetes*, which contains the sporangium; the seat of the pollinium in orchids.
foveolate Marked with small pits.
fragrant To smell sweetly; emitting a pleasant odour.
free Not joined to another organ.
free-central (placentation) Placentae on a column or projection arising from the base in the middle of the ovary, not connected to the wall by septa.
fringed Margins with hair-like appendages.
fruit A mature ovary or ovaries with or without closely related parts.
fugacious Soon falling or fading, not permanent.
fulvous Pale yellowish-brown.

funicle A stem or thread which connects the ovule or seed to the placenta.
funnel Tube gradually widened upwards; infundibuliform.
furrow Longitudinal channel or groove; succate; markedly striate.
fuse To unite into one whole.
fusiform Spindle-shaped; narrowed both ways from a swollen middle.
gametophyte The generation which bears the sexual organs, producing gametes, in turn giving rise to the sporophyte.
gamopetalous With corolla of one piece; petals united.
geniculate Abruptly bent so as to resemble the knee-joint, as in the awns and lower nodes of some *Gramineae*.
genus Groups of species; large genera are frequently divided for the sake of convenience into subgenera and sections, but the generic epithet precedes all specific epithets to form the plant name.
geophyte Plant producing underground buds, with perennial development there.
germination The first act of growth in a seed; sprouting.
gibbosity See gibbous.
gibbous Swollen on one side as in a glume; a pouchlike enlargement of the base of an organ such as a calyx.
glabrescent Becoming glabrous.
glabrous Devoid of hairs.
gland A secreting structure, on the surface or embedded in it.
glandular hairs Hairs with a gland-like structure at apex.
glaucous Bluish in colour.
glaucous Bluish in colour.
globigerina Chalky rock, consisting of decayed globigerina-foraminiferous rhizopods, found in numbers in deep parts of the ocean.
globose Spherical, globular.
globular Spherical.
glochid A barbed hair or bristle.
glochidiate With barbed bristles.
glomerule A cluster of capitula forming a common involucre.
glumaceous With glumes; resembling the glumes of grasses.
glume The chaffy two-ranked bracts of the inflorescence of grasses and similar plants (see Fig. 27).
granular Covered with very small grains; minutely or finely mealy.
granulate See granular.
greensand A variety of sandstone, usually imperfectly consolidated, consisting largely of glauconite; a formation consisting largely of this sandstone.
grooved Channelled.
gynobasic With an enlargement or prolongation of the receptacle bearing the ovary.
gynophore Stalk of an ovary prolonged within the calyx.
gynostegium A sheath or covering of the gynaeceum of whatever nature.
hairs Outgrowths of the epidermis consisting of one to several cells.
hastate Halberd-shaped; sagittate, with the basal lobes turned outwards (see Fig. 28).
haustoria Suckers of ectoparasitic plants.
head A dense spherical or flat-topped inflorescence of sessile flowers clustered on a common receptacle.
helical Curved or spiral like a snail-shell.
hemi- partly; half.
herb A plant naturally dying to the ground at the end of the growing season.

without persistent stem above ground, and lacking definite woody, firm structure.

herbaceous Not woody, dying to the ground each year; said also of soft branches before they become woody.

hermaphrodite With stamens and pistil in the same flower.

heterogamous Applied to conditions in which stamens and pistils are not regularly present in each flower or floret.

heterosporous Having spores of two distinct sizes.

heterostylous With unlike styles, or styles of different length.

hexagonal Six-sided.

hilum, hylum The scar or mark on a seed indicating the point of attachment.

hirsute With stiff or bristly hairs.

hispid With rough hairs or bristles.

hoary Covered with a close white or whitish pubescence.

homogamous With simultaneous ripening of pollen and stigmas in a perfect flower.

homosporous Having all spores of approximately the same size.

homostylous With similar or equally long styles.

honey-leaves Nectaries such as those of *Aquilegia*; perianth segments of *Ranunculaceae* which bear nectaries.

hooded Covered with something resembling a hood (a covering for the head and neck).

hook A slender process, curved or bent back at the apex.

horizontal Level.

horn An appendage shaped like an animals' horn.

horny Coriaceous intexture; hard.

horse-shoe Shaped in a more or less circular arc partially open.

humus The dark-brown or black substance resulting from the slow decomposition of organic matter.

hyaline Translucent or transparent.

hybrid A plant resulting from cross-pollination between two species usually of the same genus.

hydrographic Relating to hydrography (the science which has for its object the description of the waters of the earth's surface, comprising the study and mapping of their form and physical features, etc., and of winds, currents etc.).

hydrophyllous or-philous. Pollinated by water; dwelling in wet places.

hylum See bilum.

hypocrateriform Salver-shaped.

hypodermal Beneath the epidermis.

hypogeal Under the earth or soil.

hypogynous Free from, but inserted beneath, the ovary or gynaecium (see Fig. 29).

hypostaminal Below the stamens.

imbricate Overlapping; in aestivation said of a calyx or corolla in which one piece must be wholly internal and one wholly external, or overlapping at the edge only (see Fig. 28).

immature Not mature; unripe.

immersed Embedded; embedded in the substance of a leaf; entirely under water.

imparipinnate Unequally pinnate, with a single terminal leaflet.

impressed Bent inward, hollowed, or furrowed as if by pressure.

incised Cut sharply and irregularly and more or less deeply.

included Not protruding beyond the surrounding organ; not exerted.

incurved Bent gradually inwards.

indehiscent Not opening by valves or along regular lines.

indigenous Native to the country, not introduced.

indumentum Any hairy covering.

induplicate With the margins bent inwards, and the external face of these edges applied to each other without twisting.

indurate Hardened.

indusium The epidermal outgrowth covering the sori on ferns; a ring of collecting hairs below the stigma.

inferior An organ below another, as an ovary with the perianth on top.

inflated Bladder-like, swollen, puffed up.

inflected Bent or flexed.

inflexed Turned in at the margins.

inflorescence Mode of flower-bearing; flower-cluster.

infundibuliform Funnel-shaped.

inrolled Rolled inwards.

inserted Attached to, or growing out of.

insipid More or less without taste; without perceptible flavour.

integument The covering of an organ or body; the envelope of an ovule.

intense Existing in a high degree; of colour, very deep.

inter- Between.

intercalary Used of growth which is not apical but between the apex and the base.

interlocking Locked or clasped within each other, with a partial overlapping or interpenetration of alternating projections and recesses.

interrupted Not continuous; having any symmetrical arrangement destroyed.

intra- Within.

intricate Entangled.

introduced Brought from another region.

introrse Turned or faced inward or toward the axis, as an anther facing towards the centre of the flower.

invaginated Enclosed in a sheath.

inversion Change of order or place.

inverted Turned over; top side down.

invested Covered or surrounded as with a garment.

involucre A cluster of bracts subtending a group of florets.

involute Rolled in from the edges, the upper surface within.

isthmus (Geographical). A narrow portion of land enclosed on each side by water, and connecting two larger bodies of land. (Botanical) A narrow part or organ connecting two larger parts.

isomericous With the members of successive circles of equal numbers.

jaculator A development of the indurated funicle, for ejecting the seeds.

jagged Having deep irregular indentations and projecting points.

jointed With nodes or points of real or apparent articulation.

junciform With the form of a rush.

juvenile Young, early forms.

keel A central dorsal ridge; the united petals of a papilionaceous (pea-like) flower.

labellum The third petal of orchids, usually enlarged, and by torsion of the ovary having become anterior from its normal posterior position; a similar petal in other flowers; lip.

-labiate -Lipped.

lacerate Torn at the edge, or irregularly cleft.

lobulate Cut into lobes separated by deep, narrow, irregular incisions.
lamina The limb, blade, or expanded part of a leaf or petal.
lamine Consisting of plates or layers.
lanate Clothed with woolly and interwoven hairs.
lanceolate Lance-shaped, rather narrow, tapering to both ends with the broadest part below the middle (see Fig. 28).
lateral On or at the side.
latex The milky juice of some plants; the moisture of the stigma.
latisepate Fruit with the septum across the widest diameter.
lax Loose, distant.
leading shoots The primary or terminal shoots of trees.
leaf A lateral projection on a stem at a node subtending a bud; it is usually expanded and concerned with the manufacture of food.
leaflet A single division of a compound leaf.
legume A superior, one-celled monocarpellary fruit usually dehiscent into two valves and having the seeds attached along the ventral suture; indehiscent legumes are usually constricted between the seeds and break crosswise into one-seeded segments at maturity.
lemma The lower of two bracts enclosing the flower in grasses (see Fig. 27).
lenticel A lenticular corky spot on young bark, corresponding to an epidermal stoma.
lenticular Shaped like a double convex lens.
lepidate With small scurfy scales.
ligneous Woody.
ligulate With a ligule; strap-shaped or strap-like.
ligule A strap-shaped body, as the limb of ray florets in *Compositae* (see Fig. 29), the thin scarious projection from the leaf-sheath in grasses (see Fig. 27), a narrow, membranous, acuminate structure at the leaf base in *Isoetes* and *Selaginella*; the envelope protecting the young leaf in palms, etc.
limb The border or expanded part of a gamopetalous corolla, as distinct from the tube or throat; the lamina of a leaf or petal; the branch of a tree.
linear Long and narrow with margins parallel or nearly so (see Fig. 28).
lobe Any part or segment of an organ; specifically, a part of petal, calyx or leaf that represents a division to about the middle.
locular -celled, in an ovary or anther.
loculicidal With dehiscence on the back, between the partitions into the cavity.
loculus Compartment or cell of ovary or anther.
lodicules Minute scales (usually two) outside the stamens and ovary in grasses; probably the vestiges of the perianth.
lomentaceous Bearing or resembling loment. A loment is a flat legume constricted between the seeds, falling apart at the constrictions when mature into one-seeded joints.
longitudinal Of or pertaining to length, extending lengthwise.
lanate Crescent-shaped, half-moon-shaped.
lyrate Lyre-shaped, pinnatifid with the terminal lobe large and rounded, the lower lobes small.

mammiliform With little teat or nipple-shaped processes.
marcescent Withering without falling off.
maritime Pertaining to the sea; a coastal habitat.
marl A kind of soil consisting principally of clay mixed with carbonate of lime, valuable as a fertilizer.
marsh A community on wet or periodically wet (but not peaty) soils.
mature Complete in natural development or growth; ripe.
mealy Farinaceous, of the nature of starch or containing starch.

median Pertaining to the middle.
medifixed Attached by the middle.
mediated With pith.
megasporangium The receptacle in which the larger spores of heterosporous plants are produced.
membranous Thin, more or less flexible, and translucent.
mericarp One of the two seed-like carpels of an *Umbelliferae* fruit.
meridional Southern, southerly; pertaining to the noontide position of the sun.
merous In this number of parts.
mesh Network; an open space in a network or sieve; the threads or cords forming the network.
mesocarp The middle layer of an ovary wall.
micropterous With furrows in the stems.
microsporangium The receptacle in which the smaller spores of heterosporous plants are produced.
midrib The main rib or central vein of a leaf or leaf-like structure.
minute Very small, inconspicuous.
miocene The middle division of the Tertiary strata, and the geological period it represents.
moniliform Necklace-shaped, like a string of beads.
monocarpous Bearing fruit only once.
monochasium A one-branched cyme, either entire or resulting from the reduction of cymes.
monoecious Having unisexual flowers with both sexes borne on the same plant.
mouth The orifice or opening of the tube of the calyx or corolla.
mucilage Vegetable gelatine belonging to the amylose group of carbohydrates.
muco A sharp terminal point.
mucronate Bristle-tipped.
mucronulate Tipped with a little bristle.
multilocular Many-celled, as in an ovary.
muricate Rough, with short hard points.
musk An odour resembling that produced by the Musk-deer.
musty Having the odour or taste of mouldy substances.
muticous Without a point, blunt, awnless, curtailed.
mycorrhiza An association of roots with a fungus which may form a layer outside the root (ectotrophic) or within the outer tissues (endotrophic).

naked Without its usual covering, as without hairs, or flowers without perianth, or buds without scales.
napiform Turnip-shaped.
narcotic A substance which when swallowed, inhaled or injected induces drowsiness or insensibility.
naturalized Having become thoroughly established in a region to which it is not indigenous.
native Not known to have been introduced by human agency.
nectariferous Nectar-bearing.
nectary The organ in which nectar is secreted, nectar being a sweet substance attracting insects.
nervature The disposition of the veins.
net-veined Reticulate, with any system of irregularly anastomosing veins.
nodding Curved somewhat from the vertical.
node That point on a stem which normally bears a leaf or leaves (see Fig. 27).
nodule A small knot or rounded body.
notched Nicked, emarginate.

nucumetaceous Having the hardness of a nut; catkin-like; an indehiscent mono-spermal fruit.

numerous Indefinite; not readily counted; many.

nut A dry indehiscent, usually one-celled, one-seeded fruit with bony, woody, leathery, or papery wall and in general, partly or wholly encased in an involucre or husk.

nutlet A little nut.

ob- Flattened or widened at the other end from usual, inverted.

obconic Conical, but attached at the narrower end.

obdiplostemonous With the stamens double in number to the petals and the outer stamens opposite the petals.

oblique Slanting; unequal-sided.

oblong Longer than broad, with the margins nearly parallel (see Fig. 28).

obscure Dark or dingy in colour; uncertain in affinity or distinctiveness.

obsolete Not evident or apparent; rudimentary; no longer used.

obtus Blunt or rounded at the end (see Fig. 28).

ochrea A tubular structure formed by the union of two stipules especially in the *Polygonaceae*.

offset A lateral shoot used for propagation.

oil Used for any fluid fat-bodies in plants.

oleaginous Oily and succulent.

opaque Dull; neither shining nor translucent.

operculum A lid or cover which separates by a transverse line of division.

opposite On both sides at the same level, as two leaves at a node; one part in front of another, as a stamen in front of a petal (see Fig. 28).

orbicular Flat with a circular outline.

orifice An opening by which spores etc. escape; any opening.

ornamental With accessories, embellished, adorned, decorated.

orthotropous Said of an ovule or seed with a straight axis, chalazal, at the insertion, the opening (micropyle) at the other end.

ovary That part of the gynaecium (female part of flower) which contains the ovules (see Fig. 29).

ovate Shaped like a longitudinal section of a hen's egg, the broader end basal (see Fig. 28).

overwintering With herbaceous parts present throughout the winter.

ovoid A solid that is ovate in flat outline.

ovule That which becomes a seed after fertilisation.

ovuliferous Bearing ovules.

palate A rounded projection or prominence of the lower lip of the corolla, closing the throat or very nearly so.

palca The upper of two bracts enclosing the flower in grasses (see Fig. 27).

palmate Resembling a hand with the fingers spread; having lobes radiating from a common point (see Fig. 28).

palmatisect Palmately cut, some of the lower divisions reaching very nearly or quite to the midrib, the upper ones connected by lamina.

panduriform Fiddle-shaped.

panicle A compound or branched inflorescence (see Fig. 27, 29).

paniculate Having a branched inflorescence.

pantoporate Describes a pollen grain with many pores in the outer layer (exine).

papilla A minute nipple-shaped projection.

papillose Bearing papillae.

pappus Thistledown; the various tufts of hairs on achenes or fruits especially in the *Compositae* (see Fig. 29).

parallel Extended in the same direction but equally distant at every point.

parasitic Deriving nourishment from another organism.

parietal Borne on or belonging to a wall, as parietal placentation (see Fig. 29).

paripinnate Pinnate, with an equal number of leaflets, and without a terminal one.

partial Partly; secondary, as in partial umbel.

-partite -divided.

patent Spreading.

peat A highly organic soil formed from plant debris in wet places.

pectinate Comb-like; with narrow, closely inserted segments like the teeth in a comb.

pedate Palmately divided or parted with the lateral divisions cleft (see Fig. 28).

pedicel An ultimate flower-stalk, the support of a single flower; in grasses, the stalk of a spikelet.

pedicellate Borne on a pedicel.

peduncle A primary flower stalk supporting either a cluster or a solitary flower.

pedunculate With a peduncle.

pellucid Wholly or partially transparent.

peltate Shield-shaped, as a leaf attached by its lower surface to a stalk instead of by its margin (see Fig. 28).

pelviform Basin-shaped, formed like a shallow cup.

pendulous Hanging downwards.

pentagonal Five-sided.

percurrent Extending throughout the entire length.

perennial Continuing to live from year to year.

perfoliate Having the stem apparently passing through the leaf; said of opposite leaves joined at their bases (see Fig. 28).

perforated With holes.

perianth The calyx and corolla.

pericarp The wall of a mature ovary.

perigonium Perianth, term used in monocotyledons.

perigynium A hypogynous disc; the hypogynous setae of sedges.

perigynous Borne around the ovary, as with calyx, corolla and stamens borne on the edge of a cup-shaped hypanthium (see Fig. 29).

persistent Remaining attached; not falling off.

petal One of the leafy expansions in the floral whorl termed the corolla.

petaloid Like a petal, or having a floral structure resembling petals.

petiole The stalk of a leaf.

phanerogam A plant with flowers in which stamens and carpels are distinctly developed.

phylloide Leaflike petiole having no blade.

pilose Covered with hair.

pinna The primary unit of a pinnately compound leaf.

pinnate Feather-formed, as with the leaflets of a compound leaf placed on either side of a rachis (see Fig. 28).

pinnatifid Cleft in a pinnate manner, the lobes being connected by the lamina.

pinnatifid Pinnately lobed (see Fig. 28).

pinnatifid Pinnately divided, but not quite to the base.

pinnatifid Like pinnatifid, but with some of the lower divisions reaching nearly or quite to the midrib.

pinnule A secondary pinna; the foliaceous unit of a bipinnately compound leaf.

pit A small hollow or depression; the outer covering of a drupe containing a kernel or seed.

placenta The place in the ovary ovules are attached.

placentation The arrangement of the placenta.

plane Level, even or flat surface.
 plantation A wood of planted trees, an assemblage of any growing plants which have been planted.
 plateau An elevated tract of comparatively flat or level land; a table-land.
 pretertiary The newest (uppermost) division; above the Tertiary strata, and the geological period it represents; roughly, the post million years.
 plicate Folded on the several ribs in the manner of a closed fan, occurring in palmately-veined leaves.
 plumose Hairs with side projections, resembling a feather or plume.
 plurilocular Many-celled; with many locules.
 poculiform Shaped like a goblet or drinking cup.
 pollarded Cut back to produce a mop-headed growth.
 pollen The fertilising dust-like powder produced in the anthers of phanerogams, more or less globular in shape; the male gametophyte in seed plants.
 pollination The placing of pollen on the stigmas or stigmatic surface.
 pollinium A coherent mass of pollen, as in orchids and asclepiads.
 polycarpic Fruiting many times, indefinitely.
 polygamous Bearing bisexual and unisexual flowers on the same individual.
 polygonal Many-sided.
 polyneural Many-based, many-sided.
 polypetalous With many distinct petals.
 pome A fleshy fruit, the product of a compound gynaeceum with the seeds enclosed within a papery or cartilaginous cell, as the apple.
 pore A small hole.
 posterior At or toward the back; opposite the front; towards the axis, away from the subtending bract.
 pouch Hollow and bag-like, as the spur in many orchids.
 praeae As though bitten off, terminated abruptly.
 prickles A small and weak spine-like body borne irregularly on the bark or epidermis.
 primary First in order of time or development.
 prismatic Of the shape of a prism.
 processes Projecting appendages.
 procumbent Prostrate, trailing, lying flat upon the ground.
 profuse Producing abundantly, copious.
 projectile An object adapted to be discharged by an explosive force.
 projection That which protrudes or juts out.
 prominent Standing out beyond another part.
 protandrous With anthers ripening before the carpels in the same flower.
 prothallus The gametophyte stage or generation of Pteridophytes, a multicellular and usually flattened thallus-like structure on the ground, bearing the sexual organs.
 protuberance Bulging out.
 protruding Exserted.
 pruinose With a bluish waxy powdery secretion on the surface.
 pseudocarp A fruit with its accompanying parts, as a strawberry.
 pseudoaceme Resembling a raceme, but not one.
 pseudostrophilar A part of the floral axis which remains attached to the nutlets in *Labiatae*.
 pseudoterminal Apparently, but not really terminal.
 pseudowhorl Like a whorl, but parts not cyclic, as a verticillaster.
 puberulent Minutely pubescent.
 puberulous With short hairs.
 pubescent Covered with short soft hairs or down.
 pulp The juicy or fleshy tissue of a fruit.

punctate Marked with dots, depressions or translucent glands.
 punctulate Minutely punctate.
 pungent Ending in a rigid and sharp point.
 pyramidal Resembling a pyramid, a structure with a (usually) square base, the other surfaces triangles, and meeting at a point.
 pyrene Nutlet, particularly the nutlet in a drupe.
 pyriform Pear-shaped.
 quadrangular With four angles, which are usually right angles.
 quadrate Nearly square in form.
 raceme An indeterminate inflorescence consisting of a central rachis bearing a number of flowers with pedicels of nearly equal length (see Fig. 29).
 rachis, rachis An axis bearing flowers or leaflets; petiole of a fern leaf.
 radial Radiating, as from a centre; belonging to the ray, as in the flowers of *Compositae*; actinomorphic.
 radiate Spreading from or arranged around a common centre.
 radical Belonging or pertaining to the root; arising from the base of the stem or from a rhizome.
 radicle The lower portion of the axis of an embryo seedling.
 radius The ray of *Compositae*, the outermost floret when distinct in form from those composing the disk; a partial umbel in *Umbelliferae*.
 raphides Needle-shaped crystals found in the cells of some plants.
 ray One of the radiating branches of an umbel; the marginal as opposed to the central (disc) flowers in *Compositae* or other flower clusters, when there is a difference in structure.
 raylet A little ray.
 ruin A steep clay slope, capped with limestone, bearing fallen boulders etc. of the limestone.
 receptacle The expanded portion of the axis which bears the floral organs (see Fig. 29); torus.
 recurved Bent or curved downward or backward.
 reduplicate Doubled back; as a term of aestivation in which the edges are valvate and reflexed.
 relict A surviving part; remnant.
 reflexed Abruptly curved or bent downward or backward.
 remote Scattered, not close together.
 reniform Kidney-shaped, said of the shape of some leaves.
 resin A term applied to a group of oxidised hydrocarbons, solidified or hardened terpentine, and insoluble in water.
 resiniferous Producing resin.
 resupinate Upside down, or apparently so.
 reticulate Forming a network.
 reticulation Network, the regular crossing of threads.
 reticulum A membrane of coarse fibres, in palms at the base of the petiole.
 retrorse Directed backward or downward.
 retuse With a shallow notch at a rounded apex.
 revolute Rolled backward, margin rolled toward lower side.
 rhachis see rachis.
 rhizome The rootstock or dorsiventral stem having a rootlike appearance, prostrate on or under the ground, bearing roots, the apex progressively bearing stems or leaves.
 rhombic Diamond-shaped, but broadest in the lower half (see Fig. 28).
 rib A primary vein, especially the central longitudinal or midrib.
 ridge An elevated line.

rigid Stiff, inflexible.
rim A raised edge.
rind The tough outer layer of some fleshy fruits; the outer bark of a tree, all the tissue outside the cambium.
robust Strong, vigorous; stoutly built.
root The descending axis, growing opposite from the stem, without nodes, mostly developing underground, and absorbing underground moisture from the soil.
rootstock Subterranean stem.
rosette A cluster of spreading or radiating basal leaves (see Fig. 28).
rostrum A little beak; a slender extension from the upper edge of the stigma in orchids.
rosulate In the form of a rosette (see Fig. 28).
rotate Wheel-shaped, circular and flat, applied to a gamopetalous corolla with a short tube.
rudimentary Arrested in an early stage of development.
rugose Wrinkled, as a leaf surface with sunken veins.
rugulose Finely wrinkled.
ruminant Having a chewed appearance.
runcinate Saw-toothed or sharply incised, the teeth retrorse.
sac Bag.
saccate Bag-shaped.
sagittate Enlarged at the base into two acute straight lobes, like the barbed head of an arrow (see Fig. 28).
saline Impregnated with salt.
salinity The quality of being saline; saltiness.
salviform (Salver-shaped) With a slender tube and an abruptly expanding limb.
samara A winged achene-like fruit.
sap The juice of a plant.
saprophyte A plant deriving all of its nourishment from the bodies of decaying organisms.
scabrous Slightly rough.
scabrid With short bristly hairs; rough to the touch.
scale Any thin scarious body, usually a small simple leaf, sometimes of epidermal origin.
scaloid Like a scale.
scape Leafless peduncle arising from the ground, it may bear scales or bracts but not foliage leaves and may be one- or many-flowered.
scapigerous With a scape.
scar A mark left on the stem by the separation of a leaf etc., or on a seed by its detachment.
scarious Thin, dry and membranous, not green.
scarp The steep face of a hill.
schizocarp A fruit which splits into dry, one-seeded portions, mericarp.
scorpioid Said of a coiled cluster in which the flowers are two-ranked and borne alternately at the right and left.
scrambler A plant raising itself above the ground by sprawling over other branches or other species.
sculptured Marked in a way resembling that produced by a carving tool.
secondary Not primary, subordinate.
section An important division of a genus.
second Said of parts or organs directed to one side only, usually by torsion.
sedimentary Formed by the deposition of sediment. Sediment is earthy or detrital matter deposited by aqueous agency.

seed A mature ovule.
segment One of the parts of a leaf, petal, calyx or perianth that is divided, but not truly compound; any of the parts into which an organ naturally separates or is divided; a section.
semi-half-
sepal One of the separate parts of a calyx, the outer floral whorl.
sepal Partitions.
septate Partitioned; divided by partitions.
septicidal Said of a capsule that dehisces through the lines of junction.
seriate Arranged in series of rows, either transverse or longitudinal.
sericeous Silky, clothed with closely appressed, soft, straight pubescence.
serrate With sharp teeth on the margin pointing forwards (see Fig. 26).
serrulate Serrate with minute teeth.
sessile Without a stalk of any kind, as a leaf without a petiole.
seta -ae A bristle or bristle-shaped body.
setaceous Bristle-like.
setiform In the shape of a bristle.
setose Bristly, with bristles.
setulose With minute bristles.
sexual Producing offspring by means of sexual congress.
sheath Any long or more or less tubular structure surrounding an organ or part (see Fig. 27).
shrub A low, usually several-stemmed, woody plant; a bush.
sickle-shaped With the form of a sickle, in a crescent or curved shape, sometimes with a serrated edge.
silicle A capsule less than three times as long as wide opening from below by two valves which leave the seeds attached to a framework consisting of the placentas and adjacent wall tissue and the false septum.
silique Like a silicle but more than three times as long as wide.
silky Having a covering of soft appressed fine hairs.
simple Of one piece, not compound.
sinuate With a deep wavy margin.
sinus The space between two lobes of a leaf or other expanded organ.
solenostele An amphiphloic vascular tube with widely separated leaf gaps.
solitary Single, only one from the same place.
sorus A cluster of sporangia in ferns.
sour Having a tart or acid taste, such as that of unripe fruits or vinegar.
spadix The thick or fleshy spike of certain plants, surrounded or subtended by a spathe.
spathe The bract or pair of bracts surrounding or subtending a flower cluster or spadix; it is sometimes coloured and flower-like.
spathulate Paddle- or spoon-shaped (see Fig. 23).
species Groups of actually or potentially interbreeding natural populations, which are reproductively isolated from other such groups.
speculum In *Orchidaceae*, the pattern on the lip of the flower.
spherical In the shape of a hollow globe.
spicate Like a spike, or disposed in a spike.
spicule A fine, fleshy, erect point; a diminutive or secondary spike.
spike An inflorescence consisting of a central rachis bearing a number of sessile flowers (see Fig. 29).
spikelet A diminutive spike; the unit of the inflorescence in grasses, consisting of two glumes and one or more florets (see Fig. 27).
spine A sharp woody outgrowth from the stem, usually a modified branch, sometimes a petiole, stipule or other part.
spinescent Ending in a spine or sharp point, more or less spiny.

spinose Spinelike or with spines.
 spinulose With small spines.
 spiral As though wound around an axis.
 sporangiotheca A stalk-like structure bearing sporangia.
 sporangium A sac producing spores inside.
 spore A cell which becomes free and capable of direct development into a new individual.
 sporophyll A spore-bearing leaf, or leaf associated with spores.
 sporophyte The plant in the life-cycle of alternation which produces spores.
 spreading Having a gradually outward direction, as petals from the ovary.
 spur A tubular or sac-like projection from a blossom, as of a petal or sepal; a short compact branch with little or no internodal development.
 squamiform Shaped like a scale.
 squarrose With projections outwards usually at about 90° (see Fig. 28).
 stamen The pollen-bearing organ of the flower, the male organ in the angiosperms (see Fig. 29).
 staminode A sterile stamen, or a structure resembling such and borne in the staminal parts of the flower, occasionally petal-like and showy.
 standard (petal) The upper and broad more or less erect petal of a papilionaceous flower.
 stellate Star-shaped or radiating like the points of a star.
 stem The main axis of a plant, leaf-bearing and flower-bearing as distinguished from the root-bearing axis.
 sterile Barren, as a flower without gynaecium; used for neuter flowers.
 stigma The part of a style (tip of carpel) which receives the pollen (see Fig. 29); a point on the spores of *Equisetum*.
 stigmatic Pertaining to the stigma.
 stipe The 'leaf stalk' of a fern; the support of a carpel or gynaecium.
 stipel A structure similar to a stipule, but at the base of the leaflets of a compound leaf.
 stipitate With a stipel.
 stipulate With stipules.
 stipule One of the pair of appendages borne at the base of the leaf in many plants.
 stock See rootstock.
 stolon A creeping stem of short duration produced by a plant which has a central rosette or erect stem; when used without qualification is above ground.
 stomate Specialised opening in the epidermis communicating with intercellular spaces.
 stone cells Individual cells which have become hardened by secondary deposit.
 stramineous Straw-like or straw-coloured.
 strand A bundle of vascular tissue resembling a cord.
 straw-coloured Pale brownish-yellow.
 striate With fine grooves, ridges or lines of color.
 strigose With sharp-pointed appressed straight and stiff hairs or bristles.
 strigulose Minutely strigose.
 strobilus A cone; an inflorescence largely made up of imbricated scales; the special form of the assumed type of the angiospermous flower.
 strophile An appendage at the hilum of certain seeds; a caruncle.
 style The more or less elongated part of the carpel between the ovary and the stigma (see Fig. 29).
 stylopodium The enlargement at the base of the styles in *Umbelliferae*.
 sub- Almost; not quite.
 subspecies A subdivision of a species, usually geographically or ecologically isolated from and interfertile with, other subspecies of the same species.

subtend To stand below and close to, as a bract below a flower, or a leaf below a bud.
 subterranean Under the ground.
 subtropical Of the regions bordering on the tropics.
 subulate Awl-shaped (see Fig. 28).
 succulent Juicy or pulpy.
 sucker A shoot of subterranean origin; a haustorium, sometimes restricted to the penetrating organ or papilla.
 suffrutescent Pertaining to a low and somewhat woody plant; diminutively shrubby or fruticose; woody at base.
 suffused Overspread as with a colour.
 sulcate Grooved or furrowed lengthwise.
 superficial On the surface; in placentation, when the ovules are scattered uniformly all over the inner surface of the wall of the ovary.
 superior Growing or placed above; in a lateral flower on the side next to the axis; the posterior or upper lip of a corolla is the superior.
 superposed Placed vertically over some other part.
 supplementary Of the nature of, or serving as, a supplement (something added to supply a deficiency; and aid).
 suture A junction or seam of union; a line of opening or dehiscence.
 symmetrical Actinomorphic; regular, capable of division by a longitudinal plane into similar halves.
 sympetalous With partially or wholly fused petals.
 syncarp A multiple or fleshy aggregate fruit, as the mulberry (see Fig. 29).
 tangential At right angles to, e.g. radial rays.
 tapering Regularly diminishing in diameter.
 tap root The primary descending root, forming a direct continuation from the radicle.
 tardy, tardily Slow, delayed.
 temperate Of a moderate climate; in the temperate latitudes.
 tendril A rotating or twisting threadlike process or extension by which the plant grasps an object and clings to it for support; morphologically it may be a modified stem, leaf, leaflet or stipule.
 terete Circular in transverse section, not ridged, grooved or angled.
 terminal Proceeding from or belonging to the end or apex.
 ternate In threes.
 terra soil Red earth, derived by long weathering from limestone, rich in insoluble iron hydroxides.
 terrestrial Growing in the soil in distinction from growing in water or other habitats.
 tertiary Of or pertaining to the third series of stratified formations, from the Eocene to the Pliocene.
 testa The outer coat of the seed, usually hard and brittle.
 tetrad A group of four objects, as the four pollen-grains formed from one pollen-mother cell.
 tetradynamous Having four long stamens and two short, as in *Cruciferae*.
 tetragonous With four angles.
 tetraploid See under diploid.
 texture The character of structure, as to its being fine, close, coarse, ribbed etc.
 thallus A flat leaflike organ; in some cryptogams, the entire cellular plant body without differentiation into stem and foliage.
 throat The opening into a gamopetalous corolla or perianth; the place where the limb joins the tube.

tissue The texture or material formed by the union of cells of similar origin and character, and mutually dependent.

tomentose With tomentum.

tomentum A densely matted or woolly hairiness.

tooth A small marginal lobe.

topography The features of a region or locality collectively.

torniose Cylindrical with small contractions at intervals; somewhat small-moniliform.

translucent Allowing the passage of light, yet diffusing it so as not to render bodies lying beyond clearly visible, semi-transparent.

transverse Lying across; situated or lying crosswise; extending across the length of something, at right angles.

tree A woody plant that produces one main trunk and a more or less distinct and elevated head.

triangular With three angles (see Fig. 28).

trichotomous Three-forked, branching into three divisions.

tricolpate Describes a pollen grain with three furrows in the outer layer (exine).

trifoliate Having three leaflets.

trigonus Three-angled.

trimorphic Heterogamy, with long, short and mid-styled flowers.

tripartite Divided into three parts.

tripteroid Three-winged.

triquetrous With three salient angles.

triset Divided into three.

tropical Growing within the tropics.

truncate Ending abruptly, the base or apex nearly or quite straight across (see Fig. 28).

trunk The main stem of a tree, as distinct from the roots or branches.

tube A hollow cylinder; the fused part of a corolla or calyx; a hollow, cylindrical empty prolongation of an anther.

tuber A short, thickened branch of a subterranean stem, bearing buds.

tubercle A more or less spherical or ovoid swelling; a little tuber; any excrescence, as on the roots, ascribed to the action of symbiotic organisms.

tuberculate With knoblike excrescences or tubercles.

tuberosus With tubers, tuber-like.

tubiform Tube-shaped.

tubular Like a tube.

tuffed Clustered, clumped, or caespitose.

tunic The coat of a bulb; any loose membranous skin not formed from the epidermis; the skin of a seed.

tunicated Composed of concentric layers or coats, as the bulb of an onion.

turbinate Top-shaped.

turion A scaly, often thick and fleshy shoot produced from a bud on an underground rootstock.

twining Climbing by winding the stem around a support.

ultimate To the last degree; at the end.

umbel An indeterminate inflorescence consisting of several pedicellate flowers having a common point of attachment. A compound umbel has each ray itself bearing an umbel (see Fig. 29).

umbellate With umbels; pertaining to umbels.

umbilicate Depressed in the centre.

umbilicus The hilum of a seed.

unarmed Without prickles or other armature; without a point.

uncinate Hooked at the point; with hooks.

undulate Wavy in a plane at right angles to the surface.

uni- one.

unilateral One-sided.

united Combined or joined together, to make a connected or contiguous whole.

urceolate Pitcher-like, hollow and contracted at the mouth like an urn or pitcher.

utricle A small bladder; fruit wall; a membranous sac surrounding the fruit proper in *Carex*; any bladder-shaped appendage.

vallicornia The grooves in the intervals between ridges, as in the fruit of *Umbelliferae*.

valvar With valves.

valvate Opening by valves, as in most dehiscent fruits and some anthers; parts of a flower bud that meet without overlapping.

valve One of the pieces into which a capsule naturally separates at maturity; the segment of a calyx meeting in veneration without overlapping; a partially detached flap of anther.

variety A group of organisms within a species that differs from other members of groups within the species in one or more minor characteristics but not enough to justify a new specific epithet.

vascular With vessels or ducts; with xylem and phloem.

vein A strand of vascular tissue in a flat organ such as a leaf.

veinlet A little vein.

velutinous Velvety, due to a coating of fine soft hairs.

venation Veining; arrangement of veins.

ventral Pertaining to or designating that surface of a petal etc. which faces towards the axis or centre.

ventricose Swelling or inflated on one side, as the corolla of some *Labiatae* and *Scrophulariaceae*.

vermiculate Worm-shaped.

vernifuge That which gets rid of worms.

vernal Pertaining to spring.

verrucose Covered with wart-like elevations.

verruculose With small wart-like elevations.

versatile Hung or attached near the middle and usually moving freely, as an anther attached crosswise on the apex of a filament and capable of turning.

verticillaster A false whorl composed of a pair of opposed cymes, as in *Labiatae*.

verticillate Whorled with two or more leaves at a node, cyclical.

vesicle A small bladder or cavity.

vesicular Composed or covered with little bladders or blisters.

vessel A duct or articulated tube rendered continuous by the more or less complete absorption of the intervening walls.

villous With long silky straight hairs, shaggy.

viscid In *Orchidaceae*, viscid bodies (sometimes) of the rostellum, to which the pollinia are attached.

violaceous Violet-coloured.

viscid Sticky from a tenacious coating or secretion.

viscous Glutinous, clammy.

vitta An aromatic oil tube of the fruit wall as in most *Umbelliferae*.

voluminous Of great volume or size, massive, large; full of turnings or windings.

wart A hard or firm excrescence.

weak Not strong; not strongly marked, faint; fragile.

whorl Cyclical arrangement of appendages at a node (see Fig. 23).

wing: Any membranous expansion attached to an organ; the lateral part of a papilionaceous (pea-like) flower.
 wither To become dry and shrivel up.
 woody Lignified, hard.
 woolly Clothed with long and matted or tortuous hairs.
 wrinkled Creased, rugose.

xerophilous Growing in arid places.

xerorechabra A dry soil, dark greyish-brown, limy, having brown upper and yellowish-grey lower layers.

xylem The wood elements of a vascular bundle.

zygomorphic Capable of being divided by only one plane of symmetry (see Fig. 230).

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